

# CRS Report for Congress

Received through the CRS Web

## **Military Aviation: Issues and Options for Combating Terrorism and Counterinsurgency**

**January 27, 2006**

Christopher Bolkcom  
Specialist in National Defense  
Foreign Affairs, Defense, and Trade Division

Kenneth Katzman  
Specialist in Middle East Affairs  
Foreign Affairs, Defense, and Trade Division

| Report Documentation Page  |                                    |                                     |  | Form Approved<br>OMB No. 0704-0188       |                                 |
|--|------------------------------------|-------------------------------------|--|--|---------------------------------|
| Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. |                                    |                                     |  |  |                                 |
| 1. REPORT DATE<br><b>27 JAN 2006</b>   |                                    | 2. REPORT TYPE<br><b>N/A</b>        |  | 3. DATES COVERED<br><b>-</b>             |                                 |
| 4. TITLE AND SUBTITLE<br><b>Military Aviation: Issues and Options for Combating Terrorism and Counterinsurgency</b>  |                                    |                                     |  | 5a. CONTRACT NUMBER                      |                                 |
|  |                                    |                                     |  | 5b. GRANT NUMBER                         |                                 |
|  |                                    |                                     |  | 5c. PROGRAM ELEMENT NUMBER               |                                 |
| 6. AUTHOR(S)   |                                    |                                     |  | 5d. PROJECT NUMBER                       |                                 |
|  |                                    |                                     |  | 5e. TASK NUMBER                          |                                 |
|  |                                    |                                     |  | 5f. WORK UNIT NUMBER                     |                                 |
| 7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)<br><b>Congressional Research Service The Library of Congress 101 Independence Avenue, SE Washington, DC 20540-7500</b>  |                                    |                                     |  | 8. PERFORMING ORGANIZATION REPORT NUMBER |                                 |
| 9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)  |                                    |                                     |  | 10. SPONSOR/MONITOR'S ACRONYM(S)         |                                 |
|  |                                    |                                     |  | 11. SPONSOR/MONITOR'S REPORT NUMBER(S)   |                                 |
| 12. DISTRIBUTION/AVAILABILITY STATEMENT<br><b>Approved for public release, distribution unlimited</b>  |                                    |                                     |  |  |                                 |
| 13. SUPPLEMENTARY NOTES  |                                    |                                     |  |  |                                 |
| 14. ABSTRACT   |                                    |                                     |  |  |                                 |
| 15. SUBJECT TERMS  |                                    |                                     |  |  |                                 |
| 16. SECURITY CLASSIFICATION OF:  |                                    |                                     | 17. LIMITATION OF ABSTRACT<br><b>SAR</b> | 18. NUMBER OF PAGES<br><b>45</b>         | 19a. NAME OF RESPONSIBLE PERSON |
| a. REPORT<br><b>unclassified</b>   | b. ABSTRACT<br><b>unclassified</b> | c. THIS PAGE<br><b>unclassified</b> |  |  |                                 |

# Military Aviation: Issues and Options for Combating Terrorism

## Summary

By all accounts, the U.S. military dominates state-on-state conflict. In the past, non-state actors (terrorists, guerrillas, drug traffickers) appeared to be less threatening to U.S. national security than the well funded, well organized, and potent armed forces of an enemy nation-state. The terrorist attacks of September 11, 2001 illustrate, however, that small groups of non-state actors can exploit relatively inexpensive and commercially available technology to conduct very destructive attacks over great distances.

Today's U.S. armed forces were developed principally with state-on-state conflict in mind. Combating non-state actors, however, presents a number of distinct challenges in terms of operations, cost, and mindset. Non-state actors generally strive to hide within civilian populations. While U.S. policy makers typically seek quick and decisive victories, non-state actors seek protracted war. Non-state actors often employ cheap, commercially available weapons, that often result in expensive responses by the United States.

Many of the weapons and methods employed today by U.S. armed forces can be used against non-state actors. Some, however, are more directly applicable than others. U.S. experience in conducting close air support (CAS), employing special operations forces (SOF) and advising friendly governments in using aviation to defend themselves from insurgents and terrorists may form a basis for building capabilities against non-state actors.

Pursuing objectives against non-state actors while "winning the hearts and minds" of local populations, or at least not alienating them, appears to be a key consideration. Recent military action has killed or captured prominent terrorists, but it is unclear whether this action actually degraded the terrorist organization's capabilities. In some cases, these actions may have even strengthened them.

There is a consensus view that airpower is one of the United States' great military advantages. Some are increasingly concerned, however, that military aviation is focused too much on the demands of fighting conventional foes to the detriment of irregular warfare (also called MOOTWA — military operations other than war), and that the Department of Defense (DOD) must re-shape its aviation forces to increase their relevance in small wars, while maintaining the capability to win major conflicts.

Determination of DOD needs for combating non-state actors and fielding more relevant forces raises a number of acquisition issues. Some argue that DOD's overall acquisition priorities are still too oriented toward large, "high tech" acquisition programs most applicable to fighting or deterring a peer competitor in state-on-state conflict. Equally important, however, are the mindset changes that may be required to transition to a force equally adept at fighting conventional and non conventional foes. These mindset changes could include changes to training, doctrine, planning and organization. This report will be updated as events warrant.

# Contents

|  |    |
|--|----|
| Introduction .....   | 1  |
| Background .....   | 2  |
| Challenges of Combating Non-State Actors .....                           | 2  |
| Operational challenges .....   | 3  |
| Mindset Challenges .....   | 3  |
| Cost Challenges .....  | 5  |
| Aviation Activities Highly Applicable to Combating Non-State Actors .... | 5  |
| Close Air Support (CAS) .....  | 5  |
| Special Operations Forces (SOF) Germane to Air Operations .....          | 7  |
| Aviation-Foreign Internal Defense (A-FID) .....                          | 8  |
| Military Air Operations Against Non-State Actors .....                   | 9  |
| Issues and Options .....   | 16 |
| Introduction .....   | 16 |
| Acquisition Priorities .....   | 17 |
| Sensors, Intelligence, and Decision Making .....                         | 18 |
| Aircraft .....   | 23 |
| Weapons .....  | 33 |
| Potential Mindset Changes .....  | 36 |
| Decentralization vs. Centralization .....                                | 36 |
| Direct action vs. Supporting or Advisory Activities .....                | 39 |

# Military Aviation: Issues and Options for Combating Terrorism

## Introduction

By all accounts, the U.S. military dominates state-on-state conflict. The United States has not faced a true peer military competitor since the Soviet Union disintegrated. Recent conflicts, such as Panama, Libya, Iraq (Desert Storm) Bosnia, Kosovo, Afghanistan, and Iraq (Iraqi Freedom) illustrate that U.S. armed forces have proven very effective at achieving classic military objectives against other countries' armed forces in a variety of circumstances. Achieving politically significant military objectives against non-state actors, including terrorists and insurgents, has proven more difficult.<sup>1</sup>

In the past, combating non-state actors was seen by many to be a "lesser included case." Non-state actors appeared to be less threatening to national security than the well funded, well organized, and much more militarily potent armed forces of an enemy nation-state. If, for example, the U.S. military was deemed adequate to deter or defeat the Soviet military, then it was also deemed adequate to combat non-state actors.

The terrorist attacks of September 11, 2001 graphically illustrate, however, that small groups of non-state actors can exploit relatively inexpensive and commercially available technology to conduct very destructive attacks over great distances. Few observers today consider non-state actors to be a "lesser included case." Increasingly it is recognized that in many cases, combating non-state actors presents a different — and in many cases greater — set of challenges than combating a conventional military foe.

Senior decision makers have a number of tools at their disposal to attempt to find, identify, track, capture, neutralize, or kill terrorists and other non-state actors. A survey of recent anti-terrorism efforts indicates, that military aviation plays a prominent role in performing these tasks. The issues for Congress include whether U.S. military aviation forces are appropriately funded, trained, equipped, employed and organized to effectively combat non-state actors.

---

<sup>1</sup> "Non-state actors" is an umbrella term that refers to a number of armed groups such as political terrorists, narco-traffickers, paramilitary insurgents, and even international organized criminal organizations. These terms are not mutually exclusive. Paramilitary groups can, for example, engage in narco-trafficking, terrorism, and crime. For example: "International terrorism is known to be linked closely with the drug trade and criminal organizations..." Lt. Gen. Gennadiy M. Yevstafyev. "Unmanned Aerial Vehicles in Classic and Terrorist Wars." *Moscow Yadernyy Kontrol*. July 5, 2004. pp. 77-82.

As the Department of Defense (DOD) endeavors to revamp itself for the different demands of the war in Iraq and the “global war on terror”, (GWOT) friction will likely ensue over funding. Will the military services divert funding from major weapons programs such as combat aircraft and aircraft carriers to fund more terrorism-relevant technologies? Or will major programs continue as planned, or be given additional funding to increase their abilities against non-state actors?

The next section provides background on terrorism and non-state actor challenges, and how military aviation may contribute to operations against these actors. The following section will address issues associated with the use of military aviation against non-state actors, and potential options for consideration.

## Background

The U.S. armed forces that are fielded today were organized, trained and equipped principally with conventional, state-on-state warfare in mind. Senior leaders in the Department of Defense (DOD) appear to appreciate the distinct challenges that combating non-state actors present, however, and are taking steps to ensure that these challenges are reflected in long-term military plans, programs, and policies.

In the spring of 2004, DOD’s 2006 Strategic Planning Guidance found that the U.S. is well positioned to deal with a conventional military adversary. Increasingly, however, the U.S. may find itself facing non-conventional foes, for which it is not well prepared.<sup>2</sup> Further, it has been reported that DOD leadership has instructed regional combatant commanders to “develop and maintain new war plans designed to reduce the chance of postwar instability like the situation in Iraq.”<sup>3</sup> Based on these plans, some predicted that the 2005 Quadrennial Defense Review (QDR) “could upend U.S. military procurement plans as Pentagon officials shift their focus from waging conventional warfare to developing new ways to counter catastrophic, disruptive and irregular threats — in a word, terrorism.”<sup>4</sup>

## Challenges of Combating Non-State Actors<sup>5</sup>

U.S. military forces may be employed against a country that sponsors terrorism or that harbors terrorists. It is generally agreed that conventional U.S. military forces are adequately trained and equipped to meet the challenge of defeating conventional forces of states that sponsor terrorism. The focus of this report is on a number of challenges associated with uses of military aviation in combating terrorists and other

---

<sup>2</sup> “Building Top-Level Capabilities: A Framework for Strategic Thinking.” *Briefing to Senior Level Review Group*. August 19, 2004.

<sup>3</sup> Greg Jaffe and David Cloud. “Pentagon’s New War Planning to Stress Postconflict Stability.” *Wall Street Journal*. October 25, 2004.

<sup>4</sup> Jason Sherman. “US War on Terror Looms for QDR.” *Defense News*. October 25, 2004.

<sup>5</sup> For an overview of this topic, see CRS Issue Brief IB10119, *Terrorism and National Security: Issues and Trends*, by Raphael Perl.

non-state actors directly. These challenges can be divided into three categories: operational challenges, mindset challenges, and cost challenges.

**Operational challenges.** Compared to the armed forces of a nation state, non-state actors are easy to defeat in direct combat. Non-state actors typically lack the equipment, training and discipline that define a military service. Actually engaging in direct combat with non-state actors is the core operational challenge. Non-state actors typically don't wear uniforms. Indeed, they generally strive to integrate themselves into the local civilian population. Thus, target identification is very challenging. Non-state actors rarely mass into easily recognizable formations. They typically lack large infrastructure or obvious logistics processes. Therefore, non-state actors present few "high value" targets for U.S. forces. This challenge has not been lost on DOD leadership. For example:

For many years, though, there's been a concern that intelligence collection capability basically rested in the ability to find a tank or an artillery piece hiding in a grove of trees. The problem now becomes how to find individuals hiding in groups of people...This presents a huge problem for us.<sup>6</sup>

The leadership and structure of non-state organizations, such as Al Qaeda, are opaque. Such organizations might be diffuse and operate over long distances. Al Qaeda, for example, often operates through partner organizations which might be small and have fluid leadership. One DOD leader has said "When we kill or capture one of these leaders, another one steps in and quickly takes their place."<sup>7</sup> Therefore, even characterizing the non-state actor target can be difficult for military planners.

Once identified, non-state actors are often difficult to engage due to concerns over collateral damage. Even conventional state-on-state conflict presents collateral damage concerns. When one party is actively trying to shield itself behind non-combatants, however, delivering weapons effects with extreme precision takes on increased importance. A RAND study summed up the operational challenges:

...ferreting out individuals or small groups of terrorists, positively identifying them, and engaging them without harming nearby civilians is an extremely demanding task. Substantial improvements will be needed in several areas before the Air Force can be confident of being able to provide this capability to combatant commanders.<sup>8</sup>

**Mindset Challenges.** Successfully combating non-state actors will likely require different training, tactics, doctrine, political strategies, and potentially rules of engagement, than are optimal for conventional military warfare. Collectively, these

---

<sup>6</sup> Lt.Gen. Michael W. Wooley. Commander, Air Force Special Operations Command. "Application of Special Operations Forces in the Global War on Terror." *Air & Space Conference 2004*. Washington, DC. September 14, 2004.

<sup>7</sup> *Ibid*

<sup>8</sup> David Ochmanek. "Military Operations Against Terrorist Groups Abroad." RAND. Santa Monica, CA. 2003.

changes may combine to require a different politico-military mindset for senior decision makers.

The U.S. military, policy makers and the general population, desire short conflicts, with clear success criteria, exit strategies, and decisive victories. In a conventional setting, “victory” typically entailed an adversary’s unconditional surrender. But non-state actors may define victory as not losing; their continued existence is a victory. This mindset characterizes several Palestinian terrorist groups that fought Israel’s occupation of Palestinian territories. In most cases, they themselves cannot achieve rapid, decisive victory, so they follow a strategy of protracted war. According to one scholar “...insurgent, terrorist and criminal organizations consciously design themselves so that our military and police forces *cannot* rapidly and decisively defeat them.”<sup>9</sup> Others note that “even dying for their cause intentionally or voluntarily is perceived as a victory (for terrorists). It’s a different paradigm than the traditional military concern for limiting casualties.”<sup>10</sup> This is characteristic of groups such as Hamas and Al Qaeda that employ suicide tactics.

The terrorist attacks of September 11, 2001 may require, and may have already initiated, a change in mindset regarding what level of threat should trigger U.S. military action. Fear that terrorists or other non-state actors, may acquire a weapon of mass destruction (a nuclear, biological or chemical weapon) has engendered debate on pre-emptive or preventative employment of U.S. armed forces. While many would support a pre-emptive attack to obviate an imminent attack on U.S. interests, the definition of what qualifies as “imminent” is highly debatable.<sup>11</sup> Further, preventing insurgent victory over a friendly government may not be enough to prevent this threat. Instead, the United States will likely desire to prevent non-state actors from taking over large portions of nation-states because these territories could be used to train terrorists and initiate attacks at global distances. The recent reported discovery of an insurgent chemical weapons lab in Fallujah, Iraq, exemplifies this threat.

In a conventional warfare setting, armed forces typically attempt to avoid civilians or shield them from the war’s consequences. When combating non-state actors, however, civilians may need to be engaged at an unprecedented level. Winning the “hearts and minds” of the local population, or at least not alienating them could become a large part of the overall counter insurgent, or counter terrorist strategy.

Terrorists and insurgents require at least tacit, if not active, support from the local population to operate effectively. In the words of one British general responsible for counter-insurgency operations “The shooting side of the business is

---

<sup>9</sup> Thomas R. Searle. “Making Airpower Effective against Guerrillas.” *Air & Space Power Journal*. Fall 2004.

<sup>10</sup> Wooley. *Op. cit.*

<sup>11</sup> See CRS Report RS21311, *U.S. Use of Preemptive Military Force*, by Richard F. Grimmett, for a more in-depth discussion of this topic.



only 25 percent of the trouble. The other 75 percent is getting the people of this country behind us.”<sup>12</sup> However, the military activities at which today’s armed forces excel, such as precisely destroying buildings or vehicles, may work counter to this “hearts and minds” strategy. According to one study “counter terrorist military attacks against elusive terrorists may serve only to radicalize large sectors of the (Muslim) population and damage the U.S. image worldwide.”<sup>13</sup>

**Cost Challenges.** Almost by definition, non-state actors employ weapons and methods that are inexpensive, when compared to training, equipping and employing a military force. However, the cost to defend against non-state actors, or to combat them, can be high. For example, terrorists can acquire man-portable, air defense systems (MANPADS) for as little as \$5,000. If a terrorist succeeded in shooting down a commercial airliner with this shoulder-fired missile, the immediate cost of losing the airplane would be over \$100 million, and the indirect costs much higher. Further, fielding technologies on commercial aircraft to defend against this threat could cost the United States \$10 billion in acquisition costs alone.<sup>14</sup> Identifying and fielding systems and methods that can combat terrorists *cost effectively* will likely be an important challenge to overcome.

## **Aviation Activities Highly Applicable to Combating Non-State Actors**

Given the right context, virtually every military aviation asset or activity can be used to combat non-state actors. Yet, some are more directly applicable than others.

**Close Air Support (CAS).** Close air support (CAS) is a military aviation mission that appears highly relevant to the non-state actor challenge. DOD defines CAS as “Air action by fixed- and rotary-wing aircraft against hostile targets that are in close proximity to friendly forces and that require detailed integration of each air mission with the fire and movement of those forces.”<sup>15</sup>

Many of the functions inherent in CAS, such as tracking enemy forces, differentiating friendly forces from foes, quickly delivering weapons against moving targets, and closely controlling and coordinating air and ground forces to reduce the chances of fratricide or collateral damage, are applicable to air-actions against non-state actors. Therefore, assessing how the CAS mission is evolving, what key challenges are inherent in the mission, and how these challenges are currently being

---

<sup>12</sup> Lt. Gen. Sir Gerald Templer, the British High Commissioner to Malaya. As cited in David Ochmanek. “Military Operations Against Terrorist Groups Abroad.” RAND. Santa Monica, CA. 2003.

<sup>13</sup> *The Sociology and Psychology of Terrorism: Who Becomes a Terrorist and Why?* A Report Prepared under an Interagency Agreement by the Federal Research Division, Library of Congress. September 1999. P.68.

<sup>14</sup> See CRS Report RL31741, *Homeland Security: Protecting Airliners from Terrorist Missiles*, by Christopher Bolkom, Andrew Feickert, and Bartholomew Elias.

<sup>15</sup> Joint Publication 1-02, “DOD Dictionary of Military and Associated Terms. As amended through 07 October 2004.”

addressed should provide a useful framework for assessing how military aviation may be applied against non-state actors.

CAS is a mission that many believe has been historically neglected in favor of more glamorous missions, such as air-to-air combat. According to the leader of DOD's Joint Close Air Support Joint Test Team, "Close air support is 'not a mission of primary emphasis' for the Air Force, and the Army treats it largely as an 'afterthought' not a primary objective."<sup>16</sup> Recent activity within DOD however, suggests that CAS is receiving increased attention, and that it is a growing mission area. This may be due to changes in the nature of adversaries, the emergence of new technologies, and evolving airpower strategy.<sup>17</sup>

*Operation Desert Storm*, the 1991 war with Iraq, can be considered a traditional state-on-state conflict. The airpower strategy during this war has been subsequently described as one of "shock and awe." Military aviation conducted a 38-day air campaign against Iraq's "strategic targets" including air defenses, power grid, roads, bridges, and political and military command, control and communications (C<sup>3</sup>). The ground campaign followed this initial air attack. CAS accounted for 8% of all combat sorties flown during Operation Desert Storm.<sup>18</sup>

*Operation Allied Force*, the 1999 NATO airstrikes against Serbian military, police and para-military forces engaged in ethnic violence in Kosovo, was a less traditional conflict. No NATO ground forces were employed in the conflict, and CAS missions supporting friendly forces accounted for 26% of the 21,111 combat sorties flown; a much higher percentage than in Iraq.<sup>19</sup>

Although DOD has not released official figures on sorties flown during *Operation Enduring Freedom* (the war in Afghanistan), the effectiveness and ubiquity of CAS missions against Taliban and Al Qaeda forces was widely reported in the press.<sup>20</sup> Particularly noteworthy was *how* CAS was conducted during this conflict. Contrary to the typical method of flying tactical aircraft such as the A-10, F-16 or AC-130 at low altitude, the Air Force attacked numerous Taliban and Al

---

<sup>16</sup> Amy Butler. "Joint Close Air Support Team Finds Air Force, Army Training Lacking." *Inside the Air Force*. July 4, 2003.

<sup>17</sup> The statistics in the following paragraphs were compiled from different sources within the Department of Defense. The sortie counting rules and definitions of CAS and other missions, such as Battlefield Air Interdiction, are not necessarily uniform among these sources or over time. Thus, these statistics should be considered illustrative, not authoritative.

<sup>18</sup> Gulf War Air Power Survey. Volume V: Statistical Compendium and Chronology. Washington, DC 1993. p. 232-233.

<sup>19</sup> Correspondence from Lt. Gen. C.W. Fulford, (USMC) Director, Joint Staff to Mr. Daniel Mulhollan, Director, Congressional Research Service. October 19, 1999.

<sup>20</sup> For example Dexter Filkins. "U.S. Jets Pound Taliban Positions In Heaviest Bombing Yet." *New York Times*. November 5, 2001. Keith B. Richburg and William Branigin. "Attacks From Out Of The Blue." *Washington Post*. November 18, 2001. Vernon Loeb. "Impact Of U.S. Bombing Is Felt In Many Ways." *Washington Post*. December 16, 2001.

Qaeda forces, which were operating in close proximity to U.S. and allied ground forces, from high altitude, using long-range bombers and precision guided munitions (PGMs).

*Operation Iraqi Freedom* witnessed another leap in the relative number of CAS sorties flown. By the declared end of state-on-state hostilities in May 2003, 79% of all combat sorties were CAS sorties; almost 10 times the ratio of CAS to non-CAS combat sorties flown in 1991.<sup>21</sup> Many believe that this heavy reliance on CAS was planned. U.S. ground forces advanced through Iraq quickly because military aviation replaced, to a great degree, the fire support normally supplied by heavy artillery.<sup>22</sup>

Many have praised the apparent increase in DOD's attention to CAS, and the successes witnessed in recent operations against both state, and non-state actors. The contemporary prosecution of CAS missions has revealed, however, shortcomings that have resulted in fratricide and slow responses to ground forces' requests for fire. Many have attributed these shortcomings to a lack of training, a lack of appropriate personnel, or sub-optimal adherence to operational processes. Equipment shortcomings may also be to blame.<sup>23</sup>

**Special Operations Forces (SOF) Germane to Air Operations.** U.S. Special Operations Forces (SOF) are small military units with special training and equipment. Specialized training may include, for example, foreign languages, psychological operations, advanced piloting skills, and terminal air control. Specialized equipment includes, for example, MH-53J/M Pave Low helicopters and MC-130E/H Combat Talon I/II aircraft. SOF forces are found in all four military services, and number approximately 40,000 soldiers, sailors, airmen, and marines.<sup>24</sup>

SOF can take both direct and indirect action against non-state actors. Direct SOF aviation-related action can include collecting intelligence, clandestinely inserting forces in close proximity to non-state actors, rescuing SOF and other forces pursued by, or held by non-state actors. SOF can also capture "high value" terrorists. One heavily reported SOF activity against non-state actors is the terminal control of strike aircraft. In *Operation Enduring Freedom*, SOF forces used their infiltration and language skills to work closely with friendly Afghan forces in opposition to the

---

<sup>21</sup> *Operation Iraqi Freedom By the Numbers*. Assessment and Analysis Division. USCENTAF LtGen Michael Moseley, Commander. April 30, 2003.

<sup>22</sup> "The war plan composed by Gen. Tommy Franks...requires unprecedented cooperation between troops on the ground and pilots and crews in the air. If all goes as designed, ground troops will race toward Baghdad so quickly that the Army's slower artillery cannons that provide crucial cover for the infantry and tanks may not be able to keep up. Instead, Army and Marine ground forces will be protected by Air Force and Navy warplanes circling at 15,000 feet and laying down a withering wall of precision bombs just ahead of their advance — a tactic known as 'close air support.'" Source: Greg Jaffe. "Getting U.S. Forces Together Poses Challenge for War Plan." *Wall Street Journal*. February 11, 2003.

<sup>23</sup> See CRS Report RL31946, *Iraq War: Defense Program Implications for Congress*, by Ronald O'Rourke, coordinator, for a discussion of fratricide issues.

<sup>24</sup> See CRS Report RS21048, *U.S. Special Operations Forces (SOF): Background and Issues for Congress*, by Andrew Feickert, or more information.

Taliban prior to the initial airstrikes. Once in position, SOF forces scouted enemy positions and provided precise coordinates for CAS aircraft to effectively attack the Taliban and Al Qaeda. While conventional military tactical air controllers were capable of controlling CAS aircraft, only SOF forces had the ability to do so clandestinely and without the support of large ground forces.

**Aviation-Foreign Internal Defense (A-FID).** Special Operations Forces can also take indirect action against non-state actors. A prominent indirect activity is advising friendly foreign governments in foreign internal defense (FID). FID is one of the primary SOF missions designated by the 1986 Goldwater-Nichols Act, which created the U.S. Special Operations Command.<sup>25</sup> DOD defines FID as “Participation by civilian and military agencies of a government in any of the action programs taken by another government or other designated organization to free and protect its society from subversion, lawlessness, and insurgency.”<sup>26</sup> According to the Air Force Special Operations Command:

The aviation aspect of FID (aviation-FID, or A-FID) is essentially one of training and advising foreign aviation forces in the sustained use of airpower supporting their own internal defense and development strategies. Aviation-FID is employed as a complement to other SOF component operations within various theaters of operation and includes such activities as support for counterinsurgency, counter narcotics, antiterrorism, and counter poaching.<sup>27</sup>

The Air Force’s 6<sup>th</sup> Special Operations Squadron (6SOS) is the sole DOD organization tasked with performing A-FID. The 6SOS was created in 1994, and currently is composed of 110 Air Force personnel. The 6SOS is based at Hurlburt Field, FL. Its budget for both FY2004 and FY2005 was \$5.6 million. The FY2006 budget request was \$5.4 million. Since September 11, 2001, the 6SOS has advised 26 different foreign countries in how to better use airpower against terrorists, insurgents and other non-state actors.<sup>28</sup>

The 6SOS does not perform basic pilot training. Instead it attempts to convey specific combat and combat support skills that are most relevant to FID. Examples of combat skills include, for example, night flying, use of gunships, air/ground coordination, calling for fire support, medical evacuation, air assault, and insertion/extraction. Examples of assistance in the aviation support includes aviation

---

<sup>25</sup> [<http://www.globalsecurity.org/military/agency/usaf/6sos.htm>].

<sup>26</sup> Joint Publication 1-02, *Op. cit.*

<sup>27</sup> Air Force Modernization Planning, *Shaping the Battlefield*, AFSOC FY08-33, Draft Mission Area Plan, 1 Dec 2003, Paragraph 2.3.1.2.2.

<sup>28</sup> Afghanistan, Azerbaijan, Bulgaria, Chad, Colombia, Ecuador, Georgia, Jordan, Kazakhstan, Krygystan, Morocco, Niger, Pakistan, Paraguay, Peru, Philippines, Poland, Qatar, Romania, Slovenia, South Korea, Sri Lanka, Tajikistan, Thailand, Uzbekistan, Yemen.

maintenance; ground safety; survival, evasion, resistance, and escape (SERE); air base defense; and command, control and communications (C<sup>3</sup>).<sup>29</sup>

An important byproduct of the A-FID mission is potential support to U.S. combatant commanders. A-FID advisors facilitate the safe and effective integration of foreign air forces into potential coalition operations by bringing those air forces closer to U.S. standards, providing to the U.S. commanders a clear understanding of the foreign air force's capabilities and limitations, and by establishing key personal relationships within the foreign air force's leadership and flight personnel.

## **Military Air Operations Against Non-State Actors**

The use of air assets against suspected terrorist or insurgent leaders has gained public prominence since the September 11, 2001 attacks on the United States, although their use did not necessarily originate with September 11 or with the United States. Since the September 11 attacks, U.S. forces appear to be making increased use of air power in anti-terrorist missions. U.S. forces have conducted several successful strikes on senior figures or allies of the Al Qaeda organization.

On the other hand, the effectiveness of air-power in an anti-terrorism, anti-insurgent mission is not unquestioned, and it is difficult to compare the effect of air strikes in comparison to other anti-terrorist methods. For example, several senior Al Qaeda operatives have not been killed in U.S. air strikes but have instead been captured in police or intelligence operations by allied law enforcement services. The most prominent of such captures was the arrest of senior Al Qaeda operative Khalid Shaykh Mohammad by Pakistani officers, reportedly working with U.S. intelligence, in March 2003. Some might argue that the arrest of Khalid Shaykh — the organization's most senior terrorist planner and the reputed architect of the September 11 attacks — damaged Al Qaeda's operating ability more than any air strike against any other Al Qaeda leader. Another senior operative, reputed to be Khalid Shaykh's replacement, Abu Faraj al-Libi, was captured in a small town (Mardan) about 70 miles northwest of Pakistan's capital, Islamabad, in March 2005. Other Al Qaeda fighters and operatives were reportedly captured in U.S. ground operations in Afghanistan. An example is a son of the Egyptian cleric Umar Abd al-Rahman, convicted of terrorist plots related to the 1993 bombing of the World Trade Center. The son, Ahmed Abd al-Rahman, reportedly was killed fighting alongside Taliban forces in a battle against U.S. troops in November 2001 during the major combat phase of *Operation Enduring Freedom*.<sup>30</sup>

Another major question is to what to attribute the success of any given anti-terrorist air operation. The success of air strikes on terrorist leaders and groups appears to depend, in large measure, on the development and timely exploitation of precise intelligence on the location and movements of these individuals. As noted in the examples below, those strikes that have been successful have generally been

---

<sup>29</sup> [<http://www.specialoperations.com/USAF/Units/16thSOW/6thSOS.htm>].

<sup>30</sup> "Son of Omar Abdel-Rahman Reported Captured or Killed in Afghanistan." *Associated Press*, November 18, 2001.

characterized by the acquisition of precise, actionable intelligence on a terrorist individual's whereabouts.

A broader question is whether or not a successful attack on an individual terrorist leader — whether by air power or any other means — contributes to the overarching goal of reducing terrorist operations by the targeted group. That broader question is significant, but difficult to measure. A terrorist organization's effectiveness might be reduced by many different variables — a reduction in popular commitment to its cause; deaths of its leaders due to other causes, including arrests or natural causes; splits within the organization; economic improvement in the areas where the group operates; the availability of senior operatives to replace those killed; and an almost infinite number of other variables. It could be argued that, if other variables remain constant, the effect of a targeted strike on an individual terrorist or insurgent group appears to depend, in some measure, on the breadth of a terrorist/insurgent organization's leadership and the capabilities of its less senior operatives. Some experts say that ethnic or territorial based groups are somewhat more resilient to the deaths of key leaders than are ideology-based organizations.<sup>31</sup>

Another argument is that some U.S. strikes cause collateral damage, causing some civilians to resent U.S. operations and perhaps give aid and comfort to the terrorist or insurgent organizations.

The following represent specific U.S. or allied country use of air power in anti-terrorist or anti-insurgent missions, and analysis of the effect of those strikes on the group to which the target individual belonged:

- One of the first uses of U.S. air power in an anti-terrorism mission was the April 1980 attempt to rescue the U.S. diplomats and other Americans held hostage by the revolutionary government in Iran.<sup>32</sup> The mission involved six fuel and equipment-carrying C-130 aircraft meeting up with eight carrier-launched Sea Stallion helicopters at a remote Iranian desert landing strip called "Desert One." The plan was for the helicopters to fly U.S. commandos to Tehran, where they would raid facilities holding the U.S. hostages, free them, and return to Desert One for evacuation. However, three Sea Stallions developed mechanical problems at Desert One - possibly due to the intake of sand into the engines - and the mission was aborted there, before flying to Tehran. The hasty abortion of the mission in the Iranian desert resulted in a collision among aircraft that killed eight U.S. military personnel. No hostages were rescued. The failure of the mission caused the Joint Chiefs of Staff and other Defense Department and government organs to assign a higher priority to the study and implementation of unconventional warfare and the strengthening of special operations forces spanning all U.S. military services.

---

<sup>31</sup> Hanley, Charles. "Targeting Leaders May Not End Terrorism, Experts Say." *St. Louis Post Dispatch*, January 22, 2006, p. 10.

<sup>32</sup> A detailed account of the hostage rescue mission is found in, Ryan, Paul. "The Iranian Rescue Mission: Why It Failed?" *Naval Institute Press*, 1985.

- Another early use of U.S. use of air-power in an anti-terrorism mission — not a targeted strike on a terrorist leader but an anti-terrorism operation nonetheless — came in October 1985 in connection with the hijacking of the cruise ship *Achille Lauro* by gunmen of the Palestine Liberation Front (PLF), headed by Abu Abbas (aka Mohammad Zaydun). The two-day hijacking, in which the PLF terrorists killed 69-year old disabled American passenger Leon Klinghoffer, ended with the four PLF hijackers ending the seizure in Egypt, in exchange for safe passage. U.S. Navy F-14 aircraft intercepted an Egypt Air 737 airliner, on which the hijackers and Abbas were flying to Tunisia. The U.S. aircraft forced the Egypt Air plane to land in Italy, where the terrorists were taken into custody by Italian authorities. (Abbas was released by Italian authorities due to lack of evidence, but in 1986 he was tried in absentia in Italy, convicted, and sentenced to life imprisonment. He later threw his support behind Israeli-Palestinian negotiations and lived out his life mostly in Baghdad, where he was captured by U.S. invasion forces in April 2003. While in U.S. custody, he died, ostensibly of natural causes in March 2004.)
- In probably the most widely noted air strike connected with the September 11 attacks, in November 2001 an armed U.S. “Predator” drone, supplemented by U.S. combat aircraft, killed Mohammad Atef, the number three leader of Al Qaeda behind Osama bin Laden and Ayman al-Zawahiri. His location was pinpointed when a Taliban defector told U.S. special forces in Afghanistan where he would be,<sup>33</sup> and the site was surveyed by the circling Predator immediately before and after the strike.<sup>34</sup> Atef’s death almost certainly represented a blow to the Al Qaeda leadership structure - he had been associated with bin Laden for the prior ten years, his daughter married bin Laden’s son in early 2001, and Atef was allegedly responsible for planning anti-U.S. operations in Somalia in 1993 and possibly the two bombings of U.S. embassies in Kenya and Tanzania in August 1998. However, it is difficult to fix precisely the degradation in Al Qaeda’s capabilities that resulted from Atef’s death, in comparison with the other U.S. and allied operations against Al Qaeda and with other factors, such as the loss of Afghanistan as a base of operations.
- In another major use of air power, U.S. warplanes dropping targeted munitions killed an Al Qaeda ally near the northern Afghan city of Konduz in late November 2001. Juma Namangani, military leader

---

<sup>33</sup> Damon Johnston. Osama’s Man in Deadly Betrayal; Deputy Killed in Air Raid. *Sunday Herald Sun*, November 18, 2001.

<sup>34</sup> Judith Miller and Eric Schmitt. “Unmanned Plane Tracks, Strikes Enemy; Predator Credited With Helping to Kill Top Bin Laden Aide.” *New York Times News Service*, November 23, 2001.

of the Islamic Movement of Uzbekistan (IMU), was widely regarded as an organization allied to Al Qaeda and most active in Central Asia. In this case, U.S. forces apparently were targeting Taliban fighters in that battle generally, and might not necessarily have been targeting Namangani specifically.<sup>35</sup> Most experts appear to agree that Namangani's death set back IMU operations significantly, and it is only now, three years later, that the group is beginning to resume operations inside Uzbekistan.<sup>36</sup> The surviving co-founder of the group, Tahir Yuldashev, is considered more a political philosopher than a militia commander or operational planner, and by most accounts he has had difficulty keeping the IMU cohesive and active following Namangani's death.

- On November 3, 2002, an armed U.S. Predator drone killed Al Qaeda's leader in Yemen, Ali Qaed Sinan al-Harithi, and five other Al Qaeda suspects driving with him in a car. Harithi was a key suspect in the October 2002 bombing of the U.S.S. Cole in Aden harbor. The government of Yemen virtually admitted that it had provided information on Harithi's movements through the Yemeni desert to U.S. intelligence, enabling the successful Predator targeting and strike.<sup>37</sup> The effect of the strike on Al Qaeda as a whole is difficult to quantify, but Al Qaeda operations in Yemen apparently have diminished significantly since Harithi's death. (Another suspected Cole plotter, an Al Qaeda operative for the Persian Gulf region, Abd al-Rahim al-Nashiri, was subsequently arrested by the United Arab Emirates and turned over to U.S. custody.)
- An armed Predator drone, assisted by precise, actionable intelligence acquired on the ground, appeared to succeed again in a June 2004 strike on a pro-Al Qaeda Pakistani militant, Nek Mohammad. His location was reportedly pinpointed based on information obtained by Pakistani military officers operating in the South Waziristan area of Pakistan where Nek Mohammad was killed.<sup>38</sup> The strike on Nek Mohammad came about three months after he reportedly helped some top Al Qaeda operatives escape a Pakistani sweep operation in South Waziristan. Nek Mohammad's death did not lead to the

---

<sup>35</sup> Steve LeVine. "The Response to Terror: Uzbekistan Opposition Leader Is Killed in U.S. Bombing — Pakistani Intelligence Official Confirms Death." *Asian Wall Street Journal*, December 6, 2001.

<sup>36</sup> "Leader of Islamic Movement of Uzbekistan Buried in Afghanistan." Interfax Central Asia News, August 13, 2002; Herman, Burt. "Central Asian Terrorist Group Apparently Targeted in Pakistan Has Kept Low Profile Since U.S. Offensive in Afghanistan." *Associated Press*, March 20, 2004. Gridneva, Falina and Valery Zhukov. "US General Says Central Asia Safer Place Due to Anti-Terror Coalition." *ITAR Tass*, August 26, 2002.

<sup>37</sup> "Yemen Hunting Man Who Fled Before CIA Hit." *Los Angeles Times*, November 20, 2002.

<sup>38</sup> Iqbal Khattak. "Can Islamabad Exploit Nek's Death." Pakistan, *Friday Times*, June 2, 2004.



subsequent capture of any high value Al Qaeda suspects that are believed to be operating in the South Waziristan area, suggesting that his death did not necessarily diminish the infrastructure available to hide or support Al Qaeda suspects in that region.

- In one of the most highly publicized uses of the Predator to conduct a targeted strike, on January 13, 2006, U.S. authorities launched Predator-based missiles at a compound in Damadola, northwest Pakistan, in an attempt to kill bin Laden's top associate, Ayman al-Zawahiri. U.S. officials have acknowledged he was the target, and that the strike was based on intelligence that he would be attending a dinner in the compound at that time. After several days, Pakistani authorities said that four or five Al Qaeda figures were hit in the strike, based on their intelligence from villagers, including Al Qaeda's top chemical weaponry expert (Abu Khabab al-Masri); Zawahiri's son-in-law; and at least two other Egyptian Al Qaeda figures responsible for operations in Afghanistan.<sup>39</sup> Zawahiri has not appeared in a contemporaneous audio or video tape since (he did appear in an apparently re-released video), but most press accounts quoting Pakistani and U.S. intelligence say Zawahiri did not attend the event and was not hit. However, at least a dozen non-combatants were killed in the strike and it provoked several days of protests in Pakistan against the United States and its policies. On January 23, 2006, Pakistan's Prime Minister Shaukat Aziz said Pakistan was not informed in advance of the strike and condemned it, although numerous press accounts said that the intelligence for the strike was provided, at least in part, by Pakistani intelligence.

The air strikes discussed above generally depended on the acquisition of precise intelligence from sources — mostly allied intelligence and military forces — on the ground. In key cases, strikes were not conducted by air power because timely, actionable intelligence was not available. According to press accounts, about a year before the September 11 attacks, Predator drones — at the time unarmed — sighted Al Qaeda training camps and figures that could have included bin Laden himself. Air assets — warplanes and cruise missiles — were not in position to strike quickly enough, and no strike was ordered.<sup>40</sup> An airstrike against Al Qaeda camps in Afghanistan in August 1998 — about two weeks after the twin bombings of U.S. embassies in East Africa — reportedly missed bin Laden by several hours. Similarly, prior to the March 2003 launch of *Operation Iraqi Freedom* to oust Saddam Hussein, there was discussion within the Bush Administration of the camp in northern Iraq run by pro-al Qaeda militant Abu Musab al-Zarqawi. No strike was ordered, in large part because, according to some who participated in the deliberations, “Because there was never any real-time, actionable intelligence that placed Zarqawi at Khurmil [northern

---

<sup>39</sup> Ahmad, Munir. “Pakistan: Al-Qaida Weapons Expert Killed.” *Associated Press*, January 19, 2006.

<sup>40</sup> Neil King and David Cloud. “Planes Saw bin Laden But Couldn't Fire on Him.” *Wall Street Journal*, November 25, 2001.

Iraq], action taken against the facility would have been ineffective.”<sup>41</sup> Since the 2003 war began, Zarqawi has gone on to become a major leader of the anti-U.S. insurgency in Iraq, and several U.S. air strikes and raids on suspected Zarqawi headquarters have not led to his death or capture. Bin Laden, as is widely known, remains at large and appeared in a video released a few days after the January 13, 2006 strike targeting Zawahiri, discussed above.

The use of air power against terrorist leaders is a relatively recent (post-September 11) development, but U.S. planners are reportedly building on the experiences of at least one U.S. ally, Israel, that has used this method for many years. As analyzed below, the effects of Israel’s use of air power against militants — even when its strikes have struck the intended targets — have produced mixed outcomes:

- In February 1992, Israel used a Hellfire missile launched from an AH-64 (“Apache”) helicopter to kill then leader of Lebanese Hizballah, Abbas Musawi, as he drove in a motorcade through south Lebanon. Hizballah, a Shiite Islamist militia backed by Iran and Syria, had become the most active opponent of Israel’s military presence in south Lebanon, which began with Israel’s invasion of Lebanon in 1982 and ended with Israel’s unilateral withdrawal in May 2000. It was believed responsible for the October 1983 bombing of the U.S. Marine barracks in Beirut, as well as the holding of U.S. civilian hostages in Lebanon during 1984-1991, and is classified as a terrorist organization by the United States. However, the killing of Abbas Musawi did not materially diminish Hizballah’s capabilities and the strike on him apparently provoked significant retaliation in the March 1992 bombing, allegedly by Hizballah, of Israel’s embassy in Buenos Aires. A U.S. report on terrorism (State Department, “Patterns of Global Terrorism: 2003”) states that Hizballah was behind the July 1994 bombing of an Argentine-Jewish cultural center in Buenos Aires, which killed 86 persons.
- In early 2004, Israeli helicopters fired missiles and killed two major leaders of Hamas, the most active of the Palestinian groups opposed to Israel’s occupation of Palestinian territory. Hamas is a Palestinian Islamist movement that has claimed responsibility for many of the suicide bombings against Israeli civilian and military targets that have taken place over the past decade. The two Hamas leaders killed in early 2004 were Shaykh Ahmad Yassin - the physically disabled founder and spiritual leader of Hamas (killed March 22, 2004); and Abd al-Aziz al-Rantisi, the political leader of Hamas appointed after Yassin’s death (killed April 17, 2004). A lower-level Hamas operative, Adnan Ghoul, was killed by an armed Israeli drone on October 21, 2004; he reputedly oversaw the manufacture

---

<sup>41</sup> Scot Paltrow. “Questions Mount Over Failure to Hit Zarqawi’s Camp.” *Wall Street Journal*, October 25, 2004.

of rockets and other weapons that Hamas uses against Israel.<sup>42</sup> The effect of these strikes on Hamas is not precisely known, but Hamas is a relatively large organization (“Patterns 2003” says it has “tens of thousands of supporters and sympathizers”) and new leaders (Khalid Mishal, Musa Abu Marzuq, Mahmoud Zohar) have been readily available to assume the places of those killed. Although Hamas suicide bombings against Israelis appear to have diminished during 2004, many attribute that observation not to Israel’s targeted killings but to a fence structure Israel has been building, which makes it difficult for Hamas and other militants to cross from the occupied territories into Israel proper. Although Hamas’ institutional capabilities apparently have not been crippled by these targeted strikes, neither did the strikes produce large sustained popular Palestinian unrest against Israel.

- One of Israel’s early uses of targeted killing incorporated air power in a support role. In April 1988, an Israeli commando team conducted a sea-borne raid on a Tunis beachfront villa inhabited by a senior PLO military commander, Khalil Wazir (Abu Jihad). He was killed in the raid. According to detailed published accounts of the operation,<sup>43</sup> two Boeing 707s outfitted with advanced electronic gear flew overhead during the raid to conduct “electronic warfare” and to keep the commando team in communication with the Israeli Defense Ministry in Tel Aviv. Other Israeli aircraft protected the Israeli sea craft during the four day voyage to Tunis and then back. In addition, Israeli helicopters were aboard a larger ship off the Tunisian coast to assist the raiding party if need be; they reportedly were not used. The implications of the operation against Khalil Wazir are a matter of speculation. Some might argue that, at the time of this killing, the PLO was already undergoing a reassessment that would lead PLO leader Yasir Arafat, in December 1988, to renounce terrorism and recognize Israel’s right to exist - a shift that led, five years later, to mutual recognition between the PLO and Israel and to negotiations to resolve their outstanding conflicts. Some might argue that Arafat was shaken by Israel’s ability to strike the senior PLO leadership in an operation so far from Israel’s borders, and that the raid might have prompted Arafat to more quickly abandon the PLO’s use of terrorism and opposition to negotiations with Israel. Others believe that Khalil Wazir was a highly energetic and effective PLO commander who, had he not been assassinated, could have forestalled or prevented the rise of more militant challengers to the PLO, such as Hamas and Palestinian Islamic Jihad (PIJ).

---

<sup>42</sup> John Ward Anderson. “Hamas Leader Killed in Airstrike.” *Washington Post*, October 22, 2004.

<sup>43</sup> David Halevy and Neil Livingstone. “Mission to Kill: The Assassination of the No.2 Man in the PLO.” *Orange Country Register*, July 3, 1988.

- Israel used air power to significant effect in its July 1976 operation to free over 100 civilians (passengers aboard Air France flight 139 from Athens to Paris, originating in Tel Aviv) hijacked and held hostage at Entebbe air field in Uganda.<sup>44</sup> This was not an operation against a specific terrorist leader or group, although the hijackers allegedly had the backing of Ugandan leader Idi Amin, a supporter of the Palestinian position in the Arab-Israeli dispute. The essential ingredient of the successful Israeli rescue force was the C-130 “Hercules,” which carried the raiding party and its equipment, including jeeps and troop carriers, the 2,500 miles from Israel to the Entebbe airfield. The aircraft carried enough equipment to enable Israeli commandos to prevail in the 90-minute battle with the hijackers and Ugandan security forces.

## Issues and Options

### Introduction

There is a consensus view in defense circles that airpower is one of the United States’ great military advantages. Some are increasingly concerned, however, that military aviation is focused too much on the demands of fighting conventional foes to the detriment of irregular warfare, and that “the challenge for the Air Force is to re-shape its forces to increase their relevance in small wars, while maintaining the capability to win major conflicts.”<sup>45</sup>

Some argue that DOD’s overall acquisition priorities are still too oriented toward large, “high tech” acquisition programs most applicable to fighting or deterring a peer competitor in state-on-state conflict. Within aviation, systems might include advanced fighter aircraft or highly specialized aircraft such as radar jammers. Others argue that these kind of platforms are still required for state-on-state conflict, despite U.S. preeminence in this area, and that new concepts of operation, new organizational schema, or technology upgrades may increase these systems’ applicability to non-state actor challenges.

In a worst case scenario, this under-focus on employing airpower against non-state actors is not a conscious decision, but caused by a fundamental shortfall in airpower training, doctrine, planning, and strategy. As a point of reference, the Air

---

<sup>44</sup> A detailed account of the Israeli operation can be found in Stevenson, William. “90 Minutes at Entebbe.” Bantam Books, 1976.

<sup>45</sup> Thomas McCarthy. *National Security for the 21<sup>st</sup> Century: The Air Force and Foreign Internal Defense*. School of Advanced Air and Space Studies. Air University. Maxwell AFB, AL. June 2004. p. 67. And Thomas R. Searle. “Making Airpower Effective against Guerrillas.” *Air & Space Power Journal*. Fall 2004.

Force's primary doctrine document guiding actions against non-state actors contains less than two pages on combating terrorism.<sup>46</sup>

Certain events in the recent Iraq war lend some traction to the argument that many in DOD lack a clear understanding of how airpower can contribute to irregular warfare. For example:

soon after the Army's 3<sup>rd</sup> Infantry Division captured Baghdad, the division released its Air Force air support operations squadron to redeploy, believing that the air-liaison element had nothing to offer at that point. Worse yet, the Airmen left because *they* were not sure how airpower and space power could contribute.<sup>47</sup>

This apparently premature dismantling of formal air-ground coordination appears to have been mirrored at higher levels. As the war in Iraq appeared increasingly likely, the Air Force created a new headquarters organization called the Air Component Coordination Element (ACCE). By all accounts, the ACCE functioned effectively and was largely responsible for smooth coordination of ground and aviation forces. But, the ACCE was dissolved in late April 2003 as major combat operations drew to a close.<sup>48</sup>

It appears that the experiences in Afghanistan and Iraq are stimulating military leaders to reexamine how ground combat is conducted. It was reported in November 2004 that, "For the first time in decades, the Army has issued a field guide to counter-insurgency warfare, an acknowledgment that the kind of fighting under way in Iraq may become more common in the years ahead."<sup>49</sup> In 2004 the Marine Corps appended its *Small Wars Manual*, which was published in 1940. A reexamination of DOD's airpower mindset appears timely, and may be critical to successfully combating non-state actors in the future.

Policy makers face the questions of the desirability of helping DOD re-orient its airpower activities toward a greater emphasis on combating non-state actors, and the means of accomplishing this re-orientation. This report explores these questions by evaluating potential changes to DOD acquisition priorities and mindset (e.g. training, doctrine, planning and organization).

## Acquisition Priorities

If military aviation acquisition priorities are to be changed to equip U.S. air forces engaged in combating non-state actors, the systems that may be considered

---

<sup>46</sup> *Military Operations Other Than War*. Air Force Doctrine Document 2-3. July 3, 2000. P.16-17.

<sup>47</sup> Searle. *Op cit*.

<sup>48</sup> Elaine Grossman. "General: War-Tested Air-Land Coordination Cell Has Staying Power." *Inside the Pentagon*. March 11, 2004.

<sup>49</sup> Douglas Jehl. "For the First Time Since Vietnam, the Army Prints a Guide to Fighting Insurgents." *New York Times*. November 13, 2004. p. A12.

include sensors; intelligence; battle management and command, control, and communications (BMC<sup>3</sup>); manned and unmanned aircraft; and munitions.

**Sensors, Intelligence, and Decision Making.** Improvements to airborne sensors, intelligence and battle management (also called command, control and communications) that might most effectively improve U.S. capabilities against non-state actors may best be described through generic (and overlapping) functions. These functions include detection, discrimination, and decision making.

*Detecting small groups of combatants* can be difficult, especially in cluttered environments like cities. DOD already operates a number of aerial sensor platforms that can be used to detect non-state actors. These include aircraft such as the U-2, E-8 JSTARS, RC-135 Rivet Joint, RC-12 Guardrail, and a number of UAVs. These assets are already heavily used for conventional military missions, and are often described as high demand/low density (HD/LD) platforms, to denote their frequent use and few numbers. In addition to their heavy tasking and few numbers, it is not clear that these sensor platforms adequately satisfy the long on-station time, low observability, low cost, ease of use, and high survivability that are attractive for non-state actor missions.

Much has been made of the recent operational use of Predator, Global Hawk, Pioneer, Shadow, and other UAVs as both sensor platforms and weapon platforms.<sup>50</sup> Perhaps a more relevant effort to the non-state actor problem is the development fielding of smaller UAVs to be operated by small groups (e.g. squad, platoon, company) of ground forces. Some types of UAVs appear ideally suited for use by SOF, and in some cases peacekeeping actions in urban and rural areas.<sup>51</sup> U.S. Marines are reportedly very satisfied with the “backpackable” Dragon Eye surveillance UAV that they use daily in Iraq.<sup>52</sup> The Air Force Special Operations Command (AFSOC) is the lead proponent of these small UAVs. The Air Force fields approximately 150 of its smallest UAVs, called the “Batcam,” used by tactical air controllers to detect and target enemy forces.<sup>53</sup> The Defense Advanced Research Projects Agency (DARPA) and other research organizations are developing even smaller “micro-UAVs” (MAVs) (e.g. SilentEyes, Wasp, Organic Air Vehicle [OAV], ), that could aid small ground units trying to navigate and survive in urban anti-terrorist operations, or contribute to locating and capturing bin Laden and other Al Qaeda leaders.<sup>54</sup>

---

<sup>50</sup> See CRS Report RL31872, *Unmanned Aerial Vehicles: Background and Issues for Congress* by Harlan Geer and Christopher Bolkcom, for more information on UAVs.

<sup>51</sup> Lt. Gen. Gennadiy M. Yevstafyev. “Unmanned Aerial Vehicles in Classic and Terrorist Wars.” *Moscow Yadernyy Kontrol*. July 5, 2004. pp. 77-82.

<sup>52</sup> Aarti Shah. “Marines in Iraq Praise Dragon Eye UAVs, Service May Buy Hundreds More.” *Inside the Navy*. November 8, 2004.

<sup>53</sup> Wooley. *Op. cit.*

<sup>54</sup> “DARPA ‘Wasp’ UAV flies for nearly two hours.” *Aerospace Daily*. October 22, 2002

Unmanned aerostats (large balloons tethered to the ground) also appear to offer attributes attractive to surveillance missions against non-state actors.<sup>55</sup> By elevating sensors thousands of feet above the ground for months on end, U.S. forces appear to have a surveillance tool that “levels the playing field” to some extent against small irregular forces which depend on concealment for protection and to prosecute their attacks. Aerostats may also help alleviate some of the well known deficiencies of satellites, such as predictable flight schedules and weather limitations. Aerostats have been deployed for this purpose, albeit in what appears to be limited numbers.

One key question for DOD is how much effort and funding is being put on small, tactical level UAVs like Batcam or Pointer, compared to more expensive and technologically challenging UAVs like Predator or Global Hawk. The top budgeted DOD UAV programs FY2004-FY2009 are J-UCAS (Joint Unmanned Combat Aerial System) at \$4.2 billion, Global Hawk at \$4.1 billion, and Predator at \$1.3 billion.<sup>56</sup> It appears that these expensive and technologically sophisticated UAV programs are taking the lion’s share of UAV funding. These systems also tend to be used, or are intended for use, by higher level theater commanders, not tactical-level ground forces. A second question for DOD is how much effort and funding is being put on fielding cost effective, unmanned aerostats for surveillance and communications compared to more expensive manned aircraft or satellite systems?

New generations of sensors may be needed to fly on these sensor platforms to improve the ability of U.S. forces to detect and monitor the activities of small groups of enemy combatants. For example, new synthetic aperture radar (SAR) that operates simultaneously in UHF and VHF to detect stationary targets under trees or camouflage, would clearly be useful.<sup>57</sup>

If they are to survive, however, non-state actors know that they must not remain stationary. Therefore, U.S. radars with ground moving target indicators (GMTI) are valuable. GMTI radars have been used in by U.S. forces in combat since 1991, and against non-state actors in Afghanistan and Iraq. While GMTI radars have proven useful in detecting and targeting small groups of irregulars, some shortcomings have been noted. For example, the number of GMTI assets was insufficient to provide desired coverage. Also, a lack of optimal base access reduced the availability of GMTI assets. Finally, it was observed that “Terrain, foliage and opportunities for enemy ground forces to disperse or avoid maneuver can hinder detection and tracking by GMTI.”<sup>58</sup>

---

<sup>55</sup> See CRS Report RS21886, *Potential Military Use of Airships and Aerostats*, by Christopher Bolkcom, for more information on aerostats.

<sup>56</sup> Jefferson Morris. “Use of UAVs in War on Terror Expanding, Weatherington Says.” *Aerospace Daily & Defense Report*. October 13, 2004.

<sup>57</sup> Ochmanek. *Op. cit.*

<sup>58</sup> Richard Dunn, Price Bingham, Charles Fowler. *Ground Moving Target Indicator Radar and the Transformation of U.S. Warfighting*. Northrop Grumman. Analysis Center Papers. February 2004. p. 3, 20.

Improved electro optical (EO) and infrared (IR) sensors will also be useful in detecting non-state actors in all environments, although most applicably, it may be argued, in remote environments. For all sensors mentioned thus far, improvement to acuity may be useful, but miniaturization likely more important.<sup>59</sup> Miniaturization should enable greater application of aerial sensors, easier deployment to remote areas, and less onerous employment by small forces trying to keep kit to a minimum. The Army, for example, is developing miniature IR cameras it hopes will weigh only three ounces and cost under \$500.<sup>60</sup> Some question how much effort is being spent to develop and field these small, and comparatively simple sensors with direct application to anti-terrorism activities compared to larger, more sophisticated, and expensive sensors.

Detecting small groups of people can be difficult, but **distinguishing enemy combatants from non-combatants**, can in many scenarios, be extremely difficult. Gathering and exploiting “actionable” intelligence is a key part of this challenge. Some have argued that

the US military’s intelligence training and collection must concentrate more on understanding criminal, terrorist, and insurgent networks, even if this means putting less emphasis on the traditional strengths of our military intelligence, such as determining the conventional ground order of battle and targeting power grids and transportation networks.<sup>61</sup>

It has been reported that DOD has initiated a “‘major program’ to develop new intelligence devices for ‘tagging, tracking and locating’ potential insurgent leaders and terrorists.”<sup>62</sup> The details of this effort are currently unclear. However, it is likely that any effort to improve the ability to differentiate terrorists from civilians, track them and target them will employ multiple airborne sensor and intelligence assets. These techniques could be exploited to more effectively attack small groups or individuals, or in law enforcement capture and arrest operations.

As mentioned earlier, one criticism that has been levied on those in DOD responsible for acquisition decisions has been that they overly emphasize large, Cold War-style programs or try to apply these programs to the anti-terrorism mission when less “high-tech” solutions may suffice. In the intelligence milieu, one caution may be made against over-reliance on a traditional U.S. strength; signals intelligence (SIGINT). While SIGINT may likely be one tool to identify and track terrorists, it may be ill advised to make it a primary tool.

---

<sup>59</sup> “Lightweight versions...sit atop the gun barrels of rifles and heavy machine guns, allowing markesmen, in dust or darkness, to spot a person a mile and a half away and a car four miles away.” Andrew Revkin. “New Sensors Report, ‘I Know They’re In There, I Can See Them Breathing,’” *New York Times*. November 22, 2001.

<sup>60</sup> Jim Garamone. “Ultra-small Camera.” *American Forces Press Service*. February 17, 2000.

<sup>61</sup> Searle. *Op. cit.*

<sup>62</sup> Greg Jaffe and David Cloud. “Pentagon’s New War Planning to Stress Postconflict Stability.” *Wall Street Journal*. October 25, 2004.



Many observers of non-state actors note that terrorists and guerrillas don't always use the technology we wish them to use. The U.S.' ability to intercept and exploit radio and cellular phone communications is well known. Osama bin Ladin, for example, is reported to avoid cell phones at all cost. Yet, the Air Force, for instance, appears to emphasize using SIGINT against non-state actors; "Experiments in the Nevada desert are using unmanned aircraft to find the exact location of enemy electronic emissions, such as the mobile phone of a terrorist in a fast-moving auto."<sup>63</sup>

Human Intelligence (HUMINT) is also a tool to identify and track terrorists. Unlike SIGINT, however, HUMINT is not a recognized U.S. strength. HUMINT may, however, in many cases prove the only way to identify terrorist leaders. While most HUMINT is the domain of the intelligence community, DODs SOF can contribute by questioning captured terrorists and searching their equipment and facilities.<sup>64</sup> These activities can reveal both the weapons available to terrorists and insight into imminent terrorist operations. In the words of one SOF leader "The ability to question some of the terrorists is invaluable.... It's this ability that we have in the special operations that helps us determine and eradicate terrorist organizations' leadership."<sup>65</sup> When conducting HUMINT-oriented operations, military SOF and CIA clandestine paramilitary forces frequently exploit military airpower for situational awareness and stealthy infiltration and extraction.

In sum, there appears to be a need to oversee DOD sensor and sensor platform acquisition plans to ensure it is adequately pursuing systems most applicable to the non-state actor threat. In the words of one observer:

In the counter guerrilla fight, the threat is not ballistic missiles but rockets, mortars, RPGs, and MANPADS. We need to bring our space-based concept down to the counter guerrilla level by deploying persistent aerial ISR platforms that provide similar wide-area coverage focused on the specific signatures of these weapons. The air platforms could take the form of tethered blimps, UAVs or manned aircraft.<sup>66</sup>

Most non-state actors will present fleeting, or time-sensitive targets. While fleeting targets are often difficult to detect, they typically present greater challenges to **decision making and battle management**. Targets are detected, but disappear before a decision to attack can be made or a weapon can be brought to bear. DOD has recognized the challenge associated with attacking fleeting targets, and it is not clear

---

<sup>63</sup> David Fulghum. "JEFX '04 Reveals New Weapons For The War on Terrorism." *Aviation Week & Space Technology*. August 16, 2004.

<sup>64</sup> The Central Intelligence Agency (CIA) conducts paramilitary operations that can contribute to the development and exploitation of HUMINT. Some argue that coordination between CIA paramilitary operations and SOF should be strengthened. Others argue that responsibility for directing and executing paramilitary operations should be shifted from the CIA to the U.S. Special Operations Command (USSOCOM). For a more detailed discussion of this topic, see CRS Report RS22017, *Special Operations Forces (SOF) and CIA Paramilitary Operations: Issues for Congress*, by Richard A. Best and Andrew Feickert.

<sup>65</sup> Wooley. *Op. cit.*

<sup>66</sup> Searle. *Op. cit.*

that acquisition priorities for the non-state actor mission are different than for the conventional military mission.

Acquisition priorities may include programs that more effectively distribute sensor information to make tactical decisions about fleeting targets, and maintaining accurate knowledge of the position of friendly ground forces.

U.S. air forces have succeeded in locating and attacking small groups of non-state actors, particularly when terminal air controllers have identified targets and supplied target coordinates to attack platforms. At least three acquisition issues pertain to better enabling these personnel. First, the GAO and others say that a lack of uniformity in laser range finders and communications equipment has limited the effectiveness of terminal controllers to direct aircraft from different services.<sup>67</sup> Second, the battlefield air operations (BAO) kits that these personnel use - typically composed of navigation equipment, computers, communication gear, night vision goggles, laser range finders, and batteries — weigh on the order of 160 lbs. Reducing the weight of this equipment would do much to increase terminal controller mobility; with potential benefits for survivability and maintainability.<sup>68</sup> Third, a move away from voice only communications to “machine-to-machine” datalinks may allow terminal air controllers to pass target coordinates directly from hand-held target designators to strike aircraft. Some assert that this improvement alone could reduce the required time to attack fleeting targets from an average of 30 minutes to less than five minutes.<sup>69</sup>

While these improvements to SOF and terminal air controllers’ equipment could potentially increase their effectiveness, they will likely remain relatively specialized and scarce resources. Increasing the priority of many battle management programs that fall under the rubric of network centric warfare (NCW) may prove beneficial to detecting, identifying, tracking, and targeting fleeting groups of non-state actors.<sup>70</sup> Many of these programs, such as the Affordable Moving Surface Target Engagement (AMSTE) or the Advanced Tactical Targeting Technology (AT3) programs seek to distribute sensing and targeting functions among a network of multi mission aircraft, rather than centralizing these functions on highly specialized (and expensive) aircraft.<sup>71</sup> Emphasizing these kinds of battle management technologies may speed up decision making against fleeting targets and may also reduce the cost of defeating non-state actors relative to the costs they incur to operate; also known as the “cost exchange ratio.”

---

<sup>67</sup> General Accounting Office, *Military Readiness: Linger Training and Equipment Issues Hamper Air Support of Ground Forces.* GAO-03-505. May 2003. p. 19.

<sup>68</sup> Mark Hewish. “USAF Evaluates Enhancements for BAO Kits.” *Jane’s International Defence Review*. November 2004.

<sup>69</sup> Wooley. *Op. cit.*

<sup>70</sup> See CRS Report RL32411, *Network Centric Warfare: Background and Oversight Issues for Congress*, by Clay Wilson, for more information.

<sup>71</sup> For more information on these two programs, see [<http://www.darpa.mil/darpacech99/Presentations/spopdf/spoamste.pdf>], and [[http://dtsn.darpa.mil/ixo/ixo\\_FeatureDetail.asp?id=8](http://dtsn.darpa.mil/ixo/ixo_FeatureDetail.asp?id=8)].

*Knowing a terrorist's location is important*, but often a decision to engage him can't be made if the location of U.S. or friendly forces, especially ground forces, is in doubt. Thus, investment in programs such as the Army's Blue Force Tracker appear directly applicable to better combating non-state actors. These investments may be especially prudent if the air forces continue to explore conducting close air support missions from high altitudes with GPS-guided munitions. These weapons are quite precise by historical standards. However, they are only as accurate as the geographical coordinates that operators input. And, operators make mistakes.<sup>72</sup> Some say that a pilot flying at low altitude — although more vulnerable to ground fire — has better situational awareness of what is transpiring on the battlefield than a pilot flying at 30,000 feet, and can use this awareness to avoid making mistakes that could result in fratricide. The implementation of Blue Force Tracker and similar systems might reclaim ground situational awareness lost due to high altitude.<sup>73</sup> Blue Force Tracker may also be useful to special operations helicopters attempting to insert or rescue ground forces pursuing or fleeing from non-state actors.<sup>74</sup>

**Aircraft.** The military services have proposed several procurement and modification efforts to improve aviation capabilities against non-state actors. These programs can be found in the strike, insertion/extraction, airlift and command and control domains.<sup>75</sup>

**Strike.** While many combat aircraft can be used to attack non-state actors, the Air Force's A-10 Warthogs and AC-130 gunships are the aircraft that specialize most in this mission area. The increased use of unmanned combat aerial vehicles (UCAVs) in this mission area also appears likely.

The Air Force currently operates an inventory of approximately 354 A-10s and OA-10s.<sup>76</sup> The current modernization plan is to spend approximately \$600,000 per aircraft to improve the Warthog's targeting capabilities.<sup>77</sup> The Precision Engagement (PE) upgrade will include an advanced targeting pod, improved cockpit displays, new data link integration and the ability to deliver GPS-guided munitions. PE variants of the A-10 should be fielded between 2007 and 2009. A Service Life

---

<sup>72</sup> An estimated 12 U.S. and coalition fighters were killed in close air support mishaps in Afghanistan.

<sup>73</sup> CRS telephone conversation with representatives of Department of the Air Force, Deputy Chief of Staff for Plans and Programs (AF/XP). November 30, 2004.

<sup>74</sup> Wooley. *Op. cit.*

<sup>75</sup> Improvements to airborne sensors are also being pursued. This issue was addressed in the *Sensors and Intelligence* section of this paper.

<sup>76</sup> The OA-10s are those A10 aircraft used for forward air control missions. Effectively, there is no difference between the two aircraft, except for an additional radio in the OA-10 to facilitate communications with ground forces. The pilots of OA-10s, however, receive additional training to enable their forward air controller duties. CRS telephone conversation with representatives of Department of the Air Force, Deputy Chief of Staff for Plans and Programs (AF/XP). November 30, 2004

<sup>77</sup> Elizabeth Rees. "ACC Aiming to Deploy Precision Engagement A-10s Only Starting in '07." *Inside the Air Force*. November 12, 2004.

Extension Program (SLEP), which would include upgrades to engines, and re-winging some of the inventory is also being considered. These upgrades should keep the A-10 flying until 2025, when it is expected to be replaced by the short take off and vertical landing (STOVL) variant of the F-35 Joint Strike Fighter (JSF).

In 2003, Air Force leaders said that some A-10s would be retired in order to pay for modernizing the remaining operational aircraft. It is not clear if this remains the current plan, or how many A-10 retirements would be required. This strategy of reducing the force structure to pay for planned upgrades has been pursued with other aircraft, such as the B-1 bomber. That particular force reduction proved unpopular with Congress, which forced the Air Force to “un-retire” many of the retired B-1s; at a cost of \$17 million.<sup>78</sup>

The Marine Corps plans to procure STOVL variants of the F-35 to replace its AV-8B Harrier F/A-18 aircraft and to conduct close air support missions (CAS). The Air Force also plans to procure some currently undetermined number of STOVL F-35s to replace the A-10. Air Force leaders also say that the F-22 will be a valuable strike platform for (CAS) missions and attacking moving ground targets.<sup>79</sup> It appears likely that these aircraft will have many attributes that will make them effective in these roles, such as precision targeting capability, and in the case of the JSF, the ability to operate from short runways and austere air facilities. It is not clear, however, that either aircraft will be cost effective. Both aircraft, but especially the F-22 appear to have many costly attributes that may not be required in a CAS platform, such as a high degree of maneuverability, high speed, and low radar cross sections. Today’s CAS platforms suggest that modern avionics and targeting capabilities are essential to effectively attacking small groups of moving targets, but modern advances in stealth, maneuverability, and speed may not be required, or even attractive. The basic design and aeronautical capabilities of the A-10, for example, date from the 1960s. With upgrades to avionics and targeting however, the Air Force believes the aircraft will remain effective until almost 2030.

The Air Force Special Operations Command (AFSOC) currently operates eight AC-130H *Spectre* and 13 of the more capable AC-130U *Spooky* gunships. AFSOC is also adding four AC-130Us to the fleet via C-130 conversions that are underway.<sup>80</sup> Current gunship capabilities appear unique and satisfactory. The effectiveness of the AC-130’s realtime exploitation of Predator UAV video images to attack moving targets was much reported during the war in Afghanistan. No other U.S. military aircraft provides the same level of firepower, precision and loiter time as the AC-130.

What appears to be at issue is the aircraft’s survivability. Fear of vulnerability to attacks from shoulder-fired missiles typically relegates the AC-130 mission to

---

<sup>78</sup> Elizabeth Rees. “Air Force To Keep 67 B-1s; Any Additions Would Be ‘Detrimental’ To Fleet,” *Inside the Air Force*. November 5, 2004.

<sup>79</sup> Tony Capaccio. “Lockheed F/A-22 Case Strengthened, Roche Says.” *BloombergNews.com* February 26, 2004.

<sup>80</sup> Michael Sirak. “US Air Force Hones Future Gunship Plans.” *Jane’s Defence Weekly*. September 1, 2004.

night time. Even during intense need, such as when ground troops were fighting to gain control of Fallujah, Iraq, the AC-130s were not flown during daylight hours.<sup>81</sup>

The Air Force could address this shortcoming in at least three general ways; improve the AC-130's survivability, develop a new gunship based on a more capable aircraft, or combine manned or unmanned aircraft working in concert to provide close air support. Options to increase the AC-130's survivability include developing more effective defensive countermeasures and decoys, fielding new weapons that could maintain the AC-130's precision and fire power, but at greater distance, and increased collaboration with UAVs to enable increased situational awareness for AC-130 crews. Some techniques to reduce the AC-130's infrared (IR), electro optical (EO), and acoustic signature may also be pursued, but the benefits of these techniques is questionable due to the AC-130's large size and slow speed, which make the aircraft highly visible.

New and more capable aircraft upon which a future gunship could conceivably be based include the C-17. An AC-17 could fly faster and higher than the AC-130, and its larger size could accommodate more, and different types of weapons. Whether this option would be cost effective is unclear. Air Force estimates put the cost of the standard C-130J Hercules transport at approximately \$50 million.<sup>82</sup> However, the AC-130U, which includes weapons, targeting systems and other upgrades is priced at \$190 million per aircraft.<sup>83</sup> The C-17, without any modifications for weapons or targeting systems, costs approximately \$191 million each.<sup>84</sup> Using the same, rough cost difference between the C-130 and the AC-130 suggests that an AC-17 could cost \$340 million each, \$140 million more than the C-17.

Replacing the AC-130 with some number of UAVs appears the most radical potential program, but perhaps most compatible with other Air Force and DOD efforts to develop network centric approaches to warfare. The number and capabilities of these UAVs are being studied, and will likely be driven much by the maturation of technologies that will give UAVs more autonomy than they currently possess, or allow a single remote operator to control multiple aircraft.<sup>85</sup>

A final issue pertains to who should operate the AC-130 and its replacement, and how many are required. Currently, the AC-130 is operated by AFSOC. Allowing conventional Air Force units to fly the Spooky gunship could expand its use and mission. Also, it has been reported on numerous occasions that the Marine Corps has

---

<sup>81</sup> Elaine Grossman. "Troops in Fallujah Lost Bid for Daytime AC-130 Gunship Fire Support." *Inside the Pentagon*. November 25, 2004.

<sup>82</sup> USAF Fact Sheet. *C-130 Hercules*. [<http://www.af.mil/factsheets/factsheet.asp?fsID=92>].

<sup>83</sup> Christopher Castelli. "Citing Iraq War, Marine Division Requests Costly AC-130." *Inside the Navy*. June 16, 2003.

<sup>84</sup> See CRS Report RL30685, *Military Airlift: C-17 Aircraft Program*, by Christopher Bolkcom, for more information.

<sup>85</sup> For more information, see "New technology to give UAVs more autonomy," *Aerospace Daily & Defense Report*, November 18, 2004, and Rich Tuttle, "Single Station To Control Multiple UAVs In AF Demo," *Aerospace Daily & Defense Report*. September 3, 2004

internally debated the efficacy of operating the AC-130.<sup>86</sup> Although procuring this aircraft would add to the Department of the Navy's topline budget, increases in operations and maintenance costs would likely not be as severe as a new type of aircraft because the Marine Corps already operates the KC-130.

The perceived effectiveness of the armed Predator UAV in Afghanistan and other countries has invigorated plans to field more strike-capable unmanned aircraft.<sup>87</sup> The Army, for example, is reportedly speeding up efforts to field its Extended Range Multi-Purpose (ERMP) UAV. In August 2005 the Army selected General Atomic's Warrior UAV for this mission. Potential munitions to be integrated onto the future UAV include AGM-114 Hellfire, Viper Strike (a modified Brilliant Anti-armor (BAT) submunition) and BLU-108 Skeet munitions. The Army hopes to field the aircraft in FY2009.<sup>88</sup> It was widely reported in 2002 and 2003 that the Army had already deployed two weaponized Hunter UAVs, but recent press reports quote Army spokesmen denying this, and saying that classification issues prohibited any further elaboration.<sup>89</sup> At issue is whether these armed UAVs will simply replicate the same capabilities provided by existing UAVs, such as Predator, or whether by virtue of being controlled by ground forces directly involved in operations with non-state actors, might provide improved levels of availability and responsiveness.

Another issue for armed UAVs may be the effectiveness of their program management, especially for the larger and more technologically aggressive programs. In their FY2005 conference report, congressional appropriators expressed their concern that the Joint Unmanned Combat Aerial System (J-UCAS) had not been properly coordinated with the military services, and cut \$200 million from the administration's budget request.<sup>90</sup> In November 2005, the J-UCAS program suffered additional program management turbulence, when it was taken away from DARPA (the Defense Advanced Research Projects Agency) and given to a joint office.<sup>91</sup> In December 2004 it was reported that DARPA had cancelled the Unmanned Combat Armed Rotorcraft (UCAR) program, apparently owing to the Army's decision to

---

<sup>86</sup> Christopher Castelli. "Citing Iraq War, Marine Division Requests Costly AC-130." *Inside the Navy*. June 16, 2003.

<sup>87</sup> Israel also appears to find armed UAVs valuable in combating non-state actors. It was reported in October 2004 that Israel was increasing its use of armed UAVs in the West Bank and Gaza strip. Alon Ben-David. "Israel 'deploying more armed UAVs in West Bank.'" *Jane's Defence Weekly*. October 13, 2004.

<sup>88</sup> Marc Selinger. "U.S. Army begins training for new version of Hunter UAV." *Aerospace Daily & Defense Report*. October 6, 2005.

<sup>89</sup> Sharon Brooks Hodge. "Army Speeds Efforts to Get Weaponized Unmanned Aerial Vehicles to Iraq." *Inside the Army*. November 8, 2004.

<sup>90</sup> H.R. 4613 (H.Rept. 108-622) p. 350.

<sup>91</sup> "Joint Air Force-Navy Office Takes Over J-UCAS Program." *Defense Daily*. November 1, 2005.

withdraw its \$500 million in funding from the program in favor of other aviation priorities.<sup>92</sup>

**Airlift.** Combating terrorists and non-state actors may put increased emphasis on airlift capabilities, owing to both geography and enemy activity. This would likely affect acquisition and modernization priorities. Roles and missions debates among the services could also ensue. The importance of effective airlift in operations against non-state actors has been recognized for some time. In 1940, the U.S. Marine Corps wrote

This type of aircraft [transport] has proven indispensable for small wars operations. The lack of railroads, improved motor roads, and navigable waterways in some of our probable theaters of operation makes the supply and transportation of troops by air more or less mandatory.<sup>93</sup>

In addition to poor roads, U.S. armed forces fighting non-state actors are likely to encounter dangerous roads. As has been demonstrated in Iraq, insurgents will likely attempt to increase the risk (and the expense) of ground transportation by employing ambushes, drive-by shootings, and improvised exploding devices (IEDs). In mid-December 2004, it was widely reported that senior DOD leaders responded to an increasingly dangerous situation on the ground by significantly increasing the amount of military cargo hauled by intra-theater aircraft.<sup>94</sup> Air transportation, it was reasoned, is more expensive and less efficient than ground transportation over these distances, but was deemed necessary to protect the lives of civilians and military personnel. A number of helicopter losses in late 2005 and early 2006 due to enemy action may merit a re-examination of this assertion.

The Air Force currently operates over 500 C-130 Hercules airlifters. These aircraft are the military's workhorse for intra-theater lift and can typically operate from runways shorter than the Air Force's long-range airlift aircraft. However, it does not appear that the C-130 is best suited to deliver supplies and reinforcements to U.S. ground forces operating in remote areas. The C-130 requires approximately 5,000 feet of runway to operate.<sup>95</sup> In South America and Central America, for instance, C-130s can operate from approximately 5% of all airstrips (540 of the 10,400 airstrips). In Africa, the C-130 can land on approximately 15% of all airstrips.<sup>96</sup> The U.S. Transportation Command (TRANSCOM) has a requirement for a short-takeoff-and-

---

<sup>92</sup> Jefferson Morris. "DARPA Cancels Third Phase of UCAR Program." *Aerospace Daily & Defense Report*. December 27, 2004.

<sup>93</sup> *Small Wars Manual*. United States Marine Corps. (GPO: Washington, 1940). Chapter IX, Aviation.

<sup>94</sup> See Bradley Graham. "Dangers on the Ground in Iraq Lead to Increased use of Airlifts." *Washington Post*. December 12, 2004. Eric Schmitt. "Cargo Flights Added to Cut Risky Land Trips." *New York Times*. December 15, 2004

<sup>95</sup> The actual length of required runway depends on a number of factors such as elevation, weather and payload. 5,000 feet is a rule of thumb.

<sup>96</sup> Wray Johnson. "The 6<sup>th</sup> Special Operations Squadron and the Icarus Syndrome." *Air & Space Power Chronicles*. January 12, 2000. Air University. Maxwell, AFB. P.8.

landing (STOL) aircraft for intra-theater airlift.<sup>97</sup> Some estimate that a STOL airlifter could operate from more than 80% of the airfields in South and Central America, for example.<sup>98</sup>

The Army wishes to satisfy the TRANSCOM requirement by procuring as many as 145 aircraft (called the Future Cargo Aircraft, FCA) to replace its aging C-23 Sherpa and some of its C-12 Huron Aircraft. The leading contenders for the contract appear to be from European manufacturers: the Alenia Aeronautica C-27J, and the CASA C-295. At issue is which aircraft to procure, and whether a U.S.-manufactured aircraft might not better satisfy this requirement. This potentially large procurement of the FCA appears to have exacerbated an ongoing roles and missions tension between the Air Force and the Army. The Air Force Air Mobility Command (AMC) has responsibility for strategic and tactical airlift missions, but the Army flies many (approximately 47 C-23s and 46 C-12s) intra-theater aircraft.<sup>99</sup> In January 2006 it was reported that the two services were negotiating a memorandum of understanding on procurement of this aircraft.<sup>100</sup>

Increased use of small, intra-theater airlifters to support ground troops engaged with non-state actors suggests two additional cautionary issues. First, while aiming to improve the distribution of men and materiel, increased use of small airlifters could create its own logistical challenges. The Marine Corps notes that “Where small air units are maintained and operated on outlying auxiliary fields, the problem of supplying fuel, ammunition, bombs, and other supplies becomes a considerable task.”<sup>101</sup>

Second, because intra theater airlifters will increasingly find themselves in harm’s way, increased effort will likely be required to protect the aircraft, and to create “airlift warriors.” Two examples include, making the airlift aircraft more difficult to target, or more survivable against manportable air defense systems (MANPADS)<sup>102</sup> and providing increased Survival, Escape, Resistance and Evasion (SERE) training for airlift personnel.

These two potential concerns may be mitigated, to some degree, by employing UAVs for tactical airlift missions to those engaged in hostilities against non-state actors. The Army, Air Force, Marine Corps, and Special Operations Command are

---

<sup>97</sup> Cynthia Di Pasquale, “Joint Staff Considers Army, Air Force Roles in Intratheater Lift.” *Inside the Army*. November 1, 2004.

<sup>98</sup> Johnson. *Op. cit.*

<sup>99</sup> Cynthia Di Pasquale, “Joint Staff Considers Army, Air Force Roles in Intratheater Lift.” *Inside the Army*. November 1, 2004.

<sup>100</sup> George Cahlink. “Army, Air Force Have 90 Days to Reach Deal on Buying Future Cargo Aircraft.” *Defense Daily*. January 13, 2006.

<sup>101</sup> *Small Wars Manual*. United States Marine Corps. (GPO: Washington: 1940). Chapter IX, Aviation.

<sup>102</sup> See CRS Report RL31741, *Homeland Security: Protecting Airliners from Terrorist Missiles*, by Christopher Bolcom, Andrew Feickert, and Bartholomew Elias, for more information.



in different stages of exploring the efficacy of fielding battlefield UAVs to conduct tactical airlift of small, but valuable payloads such as blood plasma, night vision devices, ammunition, or communications equipment. UAVs may be able to precisely and quickly deliver these kinds of critical payloads to forces remotely located or isolated by enemy action.<sup>103</sup>

**Covert Insertion, Extraction and Combat Search and Rescue.**<sup>104</sup> U.S. Special Operations Forces operate a variety of highly specialized helicopters and fixed-wing aircraft to covertly insert, extract and search for friendly forces under difficult operational circumstances. These aircraft include the Air Force's HH-60G Pave Hawk, MH-53J/M Pave Low, MC-130E/H Combat Talon, and the Army's MH-47E Chinook.

Numerous upgrades to existing aircraft are being pursued to improve their capabilities and extend their lives. The HH-60G Pave Hawk is receiving upgrades to communications, navigation, and propulsion systems. Survivability enhancements are also being pursued. The HH-60G is expected to fly until the 2014 timeframe. The Air Force hopes to then field the highly developmental Personnel Recovery Vehicle (PRV). The MH-53J/M Pave Low is receiving self protection enhancements. The Air Force plans to gradually reduce the Pave Low inventory from 33 to seven aircraft as CV-22 is fielded in 2013 time frame. The MC-130E/H Combat Talon was substantially upgraded in the early 1990s. Current efforts focus on increasing the inventory. The Air Force wants to convert 10 C-130Hs to the MC-130H configuration under Combat Talon III conversion program. The Army is pursuing radar, communications, navigation, survivability and weapons upgrades to extend the life of the MH-47G until the 2033 timeframe.

At least three new aircraft are being considered for future application to the stealthy movement of SOF and other forces engaged in anti-terrorism or counterinsurgency operations. The most mature concept is the V-22 Osprey. Some envision that the Ospreys' tilt-rotor technology will give the Air Force and Marine Corps new capabilities in terms of speed, range and payload. Some observers challenge both the V-22's capabilities and technological feasibility. The V-22's development has been troubled and its future is uncertain.<sup>105</sup>

At one point the Air Force considered using the V-22 for CSAR missions, but in 2004 announced that it would develop a new aircraft, the Personnel Recovery Vehicle (PRV) to replace its HH-60Gs. In July 2005 the PRV was renamed the

---

<sup>103</sup> Gail Kaufmann. "USAF to Test Cargo UAV." *Defense News*. September 15, 2003. Jefferson Morris. "Army Considering Using UAVs for Medical Supply Drops." *Aerospace Daily*. January 8, 2003. Jim Garamone. "SnowGoose: UAVs Enter the Airlift Business." *American Forces Press Service*. July 16, 2003. Joshua Kucera. "Marines eye UAV 'Mule.'" *Jane's Defence Weekly*. November 17, 2004.

<sup>104</sup> This topic is treated at length in CRS Report RL32447, *Military Helicopter Modernization: Background and Issues for Congress*, by Christian F.M. Liles and Christopher Bolkcom.

<sup>105</sup> For more information, see CRS Report RL31384, *V-22 Osprey Tilt-Rotor Aircraft*, by Christopher Bolkcom.

CSAR-X program. The CSAR-X could cost \$6 billion for 194 aircraft. The Air Force Special Operations command is also studying a future CSAR program, the M-X aircraft. This embryonic platform would be fielded in 2018 as a supplement to the V-22 for CSAR missions.<sup>106</sup>

Two oversight issues appear to intersect with the acquisition of aircraft for stealthy transportation of troops engaged in anti-terrorism or counterinsurgency operations: cost, and need. As described earlier, the specialized equipment on these aircraft tend to make them expensive to procure and operate. Unless coordinated closely, however, modernizing SOF aircraft could incur increased O&M as well as new procurement costs. The Air Force's CSAR-X, for example, is expected to cost \$6 billion to procure 194 new aircraft. O&M costs, are not known, because the CSAR-X is still notional. The HH-60G that it will replace, however, is 87% common with Army H-60 helicopters. DOD achieves, or should achieve, important economies of scale savings in operating large fleets of highly common systems, such as H-60 helicopters. Replacing the HH-60 with a new helicopter might not just incur \$6 billion in new spending, but could also increase O&M costs if new aircraft are unnecessarily dissimilar to others in the inventory.

Another cost issue, is what impact these relatively expensive programs may have on DOD's top line budget. Might they become targets for budget cutters in the FY2006 budget process? In December, electronic media outlets made available an internal DOD Program Budget Decision (PBD 753), that recommended termination of the Air Force's C-130J program and trimming 20 aircraft from the Navy's planned purchase over the future years defense plan (FYDP). The PBD 753 obtained by the press also recommended cutting 22 aircraft from the planned purchase of V-22s over the same time period.<sup>107</sup> Such recommendations may be an indication that the upcoming budget cycle will be contentious. Also, if implemented, such recommendations could have a direct impact on SOF-related insertion/extraction aircraft by reducing funds, driving up costs, or potentially cancelling programs.

Proponents justify many of the programs described above by the perception that today's aircraft are increasingly vulnerable to growing threats. The Air Force, and outside analysts often point out that many countries have access to surface-to-air missiles (SAMs) and information technologies that can be combined to form integrated air defense systems (IADS). The potential proliferation of IADS is one of the primary justifications put forth for developing and fielding advanced combat aircraft like the F/A-22 Raptor.<sup>108</sup> It is not clear to others, however, that IADS will be as threatening to low-flying helicopters, already fielding self-protection equipment, as they will be to high flying fixed-wing aircraft. Prior to *Operation Desert Storm*, for example, Iraq was thought to have a robust and sophisticated IADS. The first shots in that war, however, were fired by AH-64 Apache helicopters,

---

<sup>106</sup> M-X Aircraft Request for Information. August 2003. Supplied to CRS by USAF LLW via email. January 3, 2005.

<sup>107</sup> PBD 753 can be accessed at [<http://www.defensenews.com/content/static/dn.pbd753.pdf>]

<sup>108</sup> For more information, see CRS Report RL31673:*F/A-22 Captor*, by Christopher Bolkom.

led by special operations' MH-53 helicopters.<sup>109</sup> In this case, helicopters were deemed more survivable than fixed-wing aircraft, and were used to degrade Iraq's IADS so other aircraft could more freely operate.

It also appears that there may be different perspectives among the Services regarding the vulnerability of today's helicopters. The Air Force, for example, seeks the CSAR-X, in part, because it is said to be more survivable than the HH-60 helicopters it will replace.<sup>110</sup> However, Army special operations forces initiated a service life extension program (SLEP) in 2004 for all their H-60 aircraft. This suggests that Army leaders believe that H-60 helicopters are sufficiently survivable, albeit with upgrades, and don't require near term replacement.

Advanced integrated air defense systems (IADS) will be fielded exclusively by nation states, not non-state actors. Non-state actors will likely rely instead, on man-portable or vehicle-mounted and easily transportable air defense systems. Non-state actors will also tend to field those systems that they can easily access, not necessarily the most advanced systems. Thus, if IADS are sufficiently threatening to justify new SOF helicopters, it may only be in the context of conflicts with states that sponsor terrorism rather than in conflicts with terrorists or insurgents themselves.

**Command, Control and Communications (C3).** Attacking non-state actors may take U.S. air forces to regions far from established military infrastructure, or into conditions where ground forces are moving rapidly and out run their line-of-sight communications. Employing air assets in these scenarios could be facilitated by command and control aircraft dedicated to matching ground forces requests for air support, including the attack of fleeting targets, with nearby air assets. Currently, the Air Force has no command-and-control aircraft dedicated to this mission, owing to the retirement in 2002 of the EC-130E Airborne Battlefield Command and Control Center (ABCCC).

During Operation Iraqi Freedom, the E-3C AWACS assumed many of the ABCCC tasks, but, reportedly,

they were at times unable to cope with the level of communications traffic. As a result, there were times when the ground-based air-control staff in Kuwait at the V Corps Headquarters were out of communication range of attack aircraft operating in the Baghdad region.<sup>111</sup>

Air Force officers experienced a certain "comfort" in knowing that an EC-130E was pushed forward, and its sole mission was supporting CAS and combat search and rescue (CSAR) communications. While these officers say they were unsure whether AWACS could satisfy the ABCCC's role in combat, they did not express grave

---

<sup>109</sup> *Gulf War Air Power Survey. Vol. V.* (GPO: Washington, 1993), Part II: Chronology, p. 157.

<sup>110</sup> Wooley. *Op. cit.*

<sup>111</sup> Tim Ripley. "Close Air Support: Closing the Gap." *Jane's Defence Weekly*. July 2, 2003.

concern.<sup>112</sup> Regardless, if anti-guerrilla scenarios are to be increasingly encountered, exploring the efficacy of resurrecting the ABCCC's capabilities may be warranted. The Air Force's E-10A aircraft could plausibly perform some of the ABCCC's functions. Air Force advocates emphasize the E-10A's ability to "execute the Air Tasking Order (ATO)," conduct "dynamic re-tasking," and its "improved combat identification."<sup>113</sup> However, the program has been reduced by appropriations conferees.<sup>114</sup> This \$115 million cut in FY2005 will, according to the Air Force, delay delivery of the planned fourth aircraft until 2015.<sup>115</sup> Also, the aircraft's most advanced aerial C3 capabilities are planned for the out-years, and are currently unfunded.<sup>116</sup> Press reports in December 2005 and January 2006 predict a dramatic reduction to the E-10 program in DOD's FY2007 budget..

While the Air Force appears to have taken recent steps that have decreased its airborne command and control capabilities, the Marine Corps and Army, the services most directly engaged in combating non-state actors on the ground, appear to be taking steps to increase their airborne command and control capabilities.

The Marine Corps operates a limited number of Direct Air Support Center-Airborne (DASC(A)) terminals based on KC-130 aircraft dedicated to this mission. The aircraft were reportedly used in Operation Iraqi Freedom much more than in previous conflicts. However, these assets may require upgrades to increase their effectiveness. Reportedly, for example, DASC(A) crew used paper copies of the daily air tasking order (ATO) to help direct aircraft and track their missions. To date, the system cannot maintain an electronic version of the ATO or receive electronic updates.<sup>117</sup> This deficiency will likely limit the DASC(A)'s capabilities in rapidly changing operational circumstances, and appears in need of remedy.

The Army has been using prototypes of its Army Airborne Command and Control System (A2C2S) in Iraq for approximately one year. The A2C2S is based on UH-60L Blackhawk helicopters and works as a flying command post by allowing commanders at the brigade level and above to maintain digital command, control and communications of ground forces engaged in warfighting and peacekeeping. Low rate initial production of the A2C2S began in December 2004, and as many as 120 systems could be fielded.<sup>118</sup>

---

<sup>112</sup> CRS telephone conversation with representatives of Department of the Air Force, Deputy Chief of Staff for Plans and Programs (AF/XP). November 30, 2004.

<sup>113</sup> *The E-10A: Transformational Capabilities to Put Cursor Over Target*. Briefing given to CRS by USAF XORI and LLW. June 23, 2004.

<sup>114</sup> H.R. 4613 (H.Rept. 108-622), p. 315.

<sup>115</sup> Cynthia di Pasquale. "Congressional Cuts Push Final E-10A Delivery Date to 2015." *Inside the Air Force*. October 22, 2004.

<sup>116</sup> E-10A Briefing. *Op. cit.*

<sup>117</sup> Robert Wall. "Fight Control." *Aviation Week & Space Technology*. June 16, 2003.

<sup>118</sup> "Raytheon Delivers First Airborne C2 Systems to Army." *Defense Today*. December 17, 2004.

Many DOD R&D efforts are focused on creating network-centric approaches to warfighting that will improve current “platform-centric” capabilities. Depending on the specific capabilities desired, the nodes of these various networks could be composed of numerous types of aircraft, ships or ground vehicles. UAVs appear to be a likely platform for increasing airborne communications and networking for forces operating in remote or austere environments. In December 2004 the Boeing Company announced that it had demonstrated a high-speed, secure, wireless communications relay on its ScanEagle UAV.<sup>119</sup>

C3 in general, and airborne C3 specifically, could take on new prominence in operations against non-state actors as more and more UAVs are fielded and as aircraft take on roles (e.g. scouting, medical resupply), often satisfied by ground forces. DOD’s top acquisition official for UAVs asserted that DOD has “well over” 400 UAVs supporting current combat operations around the globe, a marked increase in number and capability from only two years ago.<sup>120</sup> In congressional testimony, Air Force Chief of Staff General John Jumper said that approximately 450 UAVs were operating in Iraq, and that there may be a need to better organize such a large fleet.<sup>121</sup>

**Weapons.** Non-state actors tend to offer smaller, softer targets than military actors, and they often shield themselves behind civilians or civilian infrastructure (e.g. hospitals, schools, religious and cultural sites). The applicability of smaller, less destructive ordnance against non-state actors has been recognized for 50 years. The U.S. Marine Corps *Small Wars Manual*, notes “...the bombing squadrons will find more use for their lighter bombs and offensive machine guns than they will for their major weapon — the heavy demolition bomb.”<sup>122</sup> In the more recent words of one high ranking Israeli general “In the past, the more lethal something was, the more effective it was. Now, sometimes it is the exact opposite.”<sup>123</sup>

Expanding DOD capabilities against non-state actors suggests increasing the ability to deliver weapons *effects* precisely. Many DOD efforts to field aircraft targeting pods, or to increase the precision of weapon guidance are likely applicable to targeting non-state actors. Developing smaller ordnance, increasing the aerial employment of guns, developing re-targetable munitions, and fielding airborne non-lethal weapons may have even greater application to the fight against non-state actors than to conventional foes.

The Air Force is developing the **Small Diameter Bomb (SDB)**, which is half the weight of the smallest bomb the Air Force uses today, the 500-pound Mark 82. Improvements in targeting accuracy is hoped to make the 250-lb weapon as effective

---

<sup>119</sup> “Boeing Demos Harris Wireless Tech Aboard ScanEagle.” *Defense Daily*. December 23, 2004.

<sup>120</sup> “UAV Armada” *Inside the Air Force*, December 17, 2004.

<sup>121</sup> Marc Selinger. “U.S. Military Aircraft Face Many Challenges In Iraq, Chiefs Say.” *Aerospace Daily & Defense Report*. November 18, 2004.

<sup>122</sup> *Small Wars Manual*. *Op. cit.*

<sup>123</sup> B.C. Kessner. “Israeli Official: Targeted Killings Matter of Perception.” *Defense Daily*. September 30, 2004.

as the 500 lb weapon. Yet, even a 250 lb weapon may be unnecessarily large for many non-state actor targets; risking unintended damage to noncombatants or friendly troops. Some argue that the 16 lb warhead on the AGM-114 Hellfire anti-armor munition is better suited for soft terrorist targets in close proximity to civilians and friendly forces.

**Inert (no warhead) practice bombs** may also be worth exploring. These weapons have been used in recent conflicts, where collateral damage was a concern. However, because the non-exploding bomb would often ricochet and skip far from the target, it was often not effective either at destroying the target or in limiting collateral damage.<sup>124</sup> Some suggest that some sort of “nonexplosive, disintegrated kinetic device that would hit the target like a 50-lb sandbag at terminal velocity, killing an individual...but leaving only a cloud of dust as collateral damage” would be worth investigation.<sup>125</sup>

Better or more pervasive employment of **aircraft guns** may offer the accuracy and low “yield” that operational planners desire when attacking non-state actors. Current aircraft guns range from relatively modest .50 caliber machine guns to very powerful 105mm cannons. These weapons can destroy vehicles and cause serious damage to buildings, but do not produce the blast and fragmentation of aerial bombs that contribute to collateral damage.

Two improvements may be considered to increase the applicability of using aerial guns against non-state actors. The first effort would be to reduce the chances of bullets ricocheting, which could cause unintended damage. To illustrate the potential effects of ricochet, when combat aircraft train in air-to-ground strafing, safety officers anticipate potential ricochets in an area as large as 50 square kilometers. These effects could cause considerable collateral damage in an urban setting. Inert aircraft rounds are being developed that are said to reduce the chances of ricochet by 90 percent and the range of rounds that do ricochet to 10 square kilometers.<sup>126</sup>

Currently, aerial guns are most effective against ground targets when the aircraft flies at relatively low altitudes, where the aircraft is vulnerable to ground fire. Another improvement would be to develop fire-control software that would provide accurate fire solutions for strafing at safe altitudes.<sup>127</sup>

Ground forces anticipating engagement with non-state actors have been developing **non-lethal weapons** for many years. Many non-lethal weapons, such as rubber bullets and tear gas, are natural extrapolations from law enforcement experience. The exploration of basing non-lethal weapons on military aircraft is less mature than ground forces’ employment, but appears to be gaining momentum. One

---

<sup>124</sup> Tim Ripley. “Close Air Support: Closing the Gap.” *Jane’s Defense Weekly*. July 2, 2003.

<sup>125</sup> Searle. *Op. cit.*

<sup>126</sup> “US looking at reduced ricochet rounds for use in urban combat.” *Jane’s International Defence Review*. November 1, 2004

<sup>127</sup> Searle. *Op. cit.*

airpower thinker has suggested “some of the toughest decisions confronting our commanders arise from the fact that airpower can kill but cannot capture. If we could detain individuals from the air until ground elements take custody of them, many of these difficulties would subside.”<sup>128</sup>

A number of air-delivered nonlethal weapons could be employed that would disperse crowds, hold crowds in place, provide a means to track the movement of people, or temporarily incapacitate small vehicles. For example, the Air Force and Navy are developing non-lethal, directed-energy weapons designed to control crowds in urban areas, such as a mobile version of Raytheon’s Active Denial System (ADS). Millimeter-wave beams of energy are being designed that induce an intolerable heating sensation on contact with the skin and might be used to disperse crowds.<sup>129</sup> Israel has developed a non-lethal acoustic weapon designed for riot control, called *The Shout*. This weapon can reportedly incapacitate crowds at 100m without causing permanent physical damage.<sup>130</sup> Acoustic weapons such as this, and “flash bang” grenades — used to stun people — could potentially also be air delivered.

Several different devices could potentially be employed on aircraft that would electronically incapacitate vehicles. Also, air delivered “sticky slimes” and foams have the effect of slowing down any sort of movement. The Coast Guard is developing *Boat Trap*, a propeller-fouling device deployed from helicopters. This net could be applicable to stopping boats such as that used to attack the USS Cole. Currently, the Coast Guard stops boats with shots from helicopter-borne .50 cal machine gun to boat’s engine, which is deemed a sub optimal solution.<sup>131</sup>

Air delivered dyes, some invisible except to an ultra violet lens, could be used to identify people or vehicles that had participated in a terrorist or insurgency act. Those dyed could be allowed to leave crowded areas and be attacked or captured later, when they were in more isolated areas. Similarly, artificial “snow” could be sprayed on the ground immediately following a terrorist attack in the hope that retreating terrorists would leave behind footprints.

At issue is whether these potential munitions improvements most relevant to the non-state actor threat are being adequately funded and pursued. Also, would more aggressive fielding of inert weapons and non-lethal devices carry risk? What complications might fielding these less lethal weapons pose for military planners and logisticians who have to equip and deploy weapons useful against both conventional foes and non-state actors? Some of these potential weapons may have high power requirements, and may generate considerable heat, which would limit the size and type of aircraft on which they could be employed. Some dyes and gases may have to

---

<sup>128</sup> *Ibid.*

<sup>129</sup> Michael Sirak. “US Air Force, Navy Eye Non-Lethal Weapon.” *Jane’s Defence Weekly*. October 27, 2004.

<sup>130</sup> Alon Ben-David. “New Non-Lethal Weapon Shouts a Warning to Rioters.” *Jane’s Defence Weekly*. October 13, 2004.

<sup>131</sup> Patricia Kime. “Netting Bad Guys.” *Armed Forces Journal*. October 2004.

be squared with policy and treaty constraints on the use of chemical and biological weapons.

## Potential Mindset Changes

Setting and implementing new acquisition priorities to more effectively combat non-state actors may be difficult. It may be far more difficult, however, to identify and implement changes to airpower planning, doctrine, coordination, strategy and tactics required to better combat non-state actors. As described in the introduction to this paper, these functions are described in aggregate as mindset changes. In conjunction with the potential changes in acquisition priorities described in the previous section of this paper, there appear to be at least two over arching mindset changes that merit consideration. They are 1) Decentralization vs Centralization, and 2) Indirect vs Direct Action.

**Decentralization vs. Centralization.** The employment of airpower against modern conventional enemies focuses to a great degree on “getting inside the enemy’s OODA loop.” The OODA loop, which stands for Observe, Orient, Decide, and Act, is a generic construct for describing an enemy’s military decision making process. By moving faster than the enemy can complete these decision making functions, or by impairing these functions (e.g. interdicting communications, destroying radars and other sensors, isolating C2 elements), airpower planners hope to achieve a rapid and decisive strategic effect on the adversary. One observer notes, however, that

unfortunately, guerrillas follow a strategy of ‘protracted war.’ Like criminals, they assume they cannot achieve rapid, decisive effects and do not attempt to do so. Instead, insurgent, terrorist and criminal organizations consciously design themselves so that our military and police forces *cannot* rapidly and decisively defeat them.<sup>132</sup>

Organizations like Al Qaeda have highly distributed command and control (C2) systems. They make strategic decisions and execute operational plans in decentralized ways. On the other hand, the tactical “OODA loop” in a suicide bomber or guerrilla ambush, as just two examples, is instantaneous, because the sensor, the decision maker and the “shooter” are centralized in the same person.

A key set of questions for policy makers focuses on whether current DOD airpower doctrine is adequately suited for dealing with non-state actors which operate in highly decentralized ways. Do currently planned joint experiments and exercises focus on combating such terrorists and guerrillas? If not, how will DOD develop new operational concepts and strategies for defeating such non traditional foes? Currently, the Air Force and Army do not conduct exercises dedicated to close air support (CAS). Instituting such exercises could be considered.<sup>133</sup>

---

<sup>132</sup> Searle. *Op. cit.*

<sup>133</sup> Michael Sirak. “US Air Force Eyes Better Integration with Army.” *Jane’s Defence Weekly*. November 10, 2004.



Just as non-state actors decentralize their planning and execution, the U.S. military, when fighting such enemies, could adopt more decentralized planning, and command and control of airpower. However, this approach may be viewed as anathema by some aviation leaders, and may require determined oversight to explore fully. This is because classic air doctrine calls for operations that are planned and controlled centrally, but executed in a decentralized manner. This “golden rule” seeks to maintain unity of command while allowing improvisation by those directly engaged in combat. Air Force doctrine dictates that Air Force assets be centrally commanded and controlled, even when fighting terrorists and irregular forces.<sup>134</sup>

Centralized planning and control of airpower engaged in fighting a distributed, decentralized foe however, may prove disadvantageous. Over 60 years ago the Marine Corps’ *Small Wars Manual* identified the need to match the enemy’s decentralization with a similar fluidity of command and independence of action.

the employment of small striking units will be frequent, and independent missions for the division the rule rather than the exception.....the air observer in small wars operations must be given greater latitude in estimating a situation on the ground than he would be given in a comparable position in major operations. Often the rapidly moving situation will not permit delay in the transmission of information to headquarters, but requires immediate positive action on the part of the air patrol commander.<sup>135</sup>

More contemporary analysts assert that combating non-state actors is analogous to fighting decentralized and distributed criminal organizations, and that airpower should more closely emulate law enforcement activities, which are locally planned and executed.<sup>136</sup>

One approach to decentralizing air operations against non-state actors, particularly in the area of close air support (CAS) would be to coordinate air and ground forces at lower levels of organization than is currently practiced. Coordination at lower levels can take place both within and between Services.

It appears that steps are being taken by the Army, for instance, to coordinate air and ground operations at lower command levels. Traditionally, much of the Army’s aviation was found at the corps level. According to Army leaders, however, aircraft and aviation personnel are being moved from the corps to the division level, and a brigade aviation element will be attached to all Army ground brigades.<sup>137</sup> While this may be a step in the right direction, questions remain. Army platoons (16-40 soldiers) and companies (100-200 soldiers) tend to be directly engaged with non-state actors. Yet, platoons and companies are far down the organizational ladder from

---

<sup>134</sup> *Military Operations Other Than War*. Air Force Doctrine Document 2-3. July 4, 2000. HQ AFDC/DR. Washington, DC. P. 32.

<sup>135</sup> *Small Wars Manual*. *Op. cit.*

<sup>136</sup> Thomas R. Searle. “Making Airpower Effective against Guerrillas.” *Air & Space Power Journal*. Fall 2004.

<sup>137</sup> Ann Roosevelt. “Modular Brigade Aviation Will Complete in 2007, General Says.” *Defense Daily*. October 26, 2004.

division headquarters. Will moving aircraft and personnel from the corps to the division level make an appreciable difference in the timeliness and effectiveness of aviation support to these small Army organizations? Also, some Army ground units (e.g. elements within the 82<sup>nd</sup> Airborne, 101<sup>st</sup> Air Assault, 10<sup>th</sup> Mountain divisions), will likely require more air support than others. Have provisions been made to better coordinate air and ground operations at lower organizational levels within the Army based on anticipated *mission needs*?

The increased fielding of Army UAVs may be one method of boosting airpower in support of ground troops, and decentralizing airpower planning and control. As part of its Future Combat System (FCS) program, the Army plans to field three classes of UAVs. The smallest system is intended to be man-portable, and used at the platoon level (16-40 soldiers).<sup>138</sup> Pervasively deploying UAVs among the Army's or the Marine Corps' smallest ground units could facilitate the detection and targeting of non-state actors, as well as communication with larger ground units. Army or Marine Corps) UAVs could also potentially replace or augment manned aviation, performing such roles as tactical airlift, or medical resupply. By owning and controlling these resources themselves, small ground units may be able to employ them more fluidly and responsively to the anticipated tactical situation than would aircraft controlled by higher echelons of forces.

Much operational air and ground coordination between the services, such as between the Army and the Air Force, tends to occur at the battalion level and higher. Tactical Air Control Parties (TAC-Ps) are typically composed of an Air Force officer who coordinates with the Army battalion's operations officer, and three airmen. Three of the four have received extensive training to coordinate and control air strikes in support of ground forces. Many have suggested that TAC-Ps be embedded in Army units smaller than the battalion, such as companies, or perhaps even platoons. Regularly integrating air controllers into lower levels of Army organizations would require additional personnel than currently are trained for this mission. While this integration could help decentralize air-to-ground coordination, and facilitate air-ground forces coordination, which service would provide these additional air controllers is not clear.

The Army is reportedly interested in increasing the training its artillery fire support officers receive, to enable them to also control aircraft. A joint force air controller program, with standardized training and procedures might be part of this process. According to some Army leaders "...the Army needs to be able to train its own soldiers to call in air strikes to supplement what the Air Force provides. 'Having just one person with a critical skill in any direct-fire ground combat [unit] is a recipe for disaster.'"<sup>139</sup>

---

<sup>138</sup> Lisa Troshnisky. "FCS UAV Technology Will Be Ready When Funding Is, Official Says." *Aerospace Daily & Defense Report*. November 2, 2004.

<sup>139</sup> Greg Jaffe. "Getting U.S. Forces Together Poses Challenge for War Plan." *Wall Street Journal*. February 11, 2003.

The Air Force has reportedly resisted this idea, and would prefer to satisfy the Army's need for additional controllers by increasing the number of Air Force air controllers.<sup>140</sup> According to press reports:

Air Force officials are skeptical about turning over the mission to Army troops. Air Force controllers, who get five years of training, have to juggle as many as a dozen planes, each carrying different kinds of bombs with different capabilities. Air Force officials question whether there are enough planes in their arsenal to train more Army controllers.<sup>141</sup>

Some Air Force air controllers point out that profound “cultural differences” exist between how the Army and the Air Force perceives airpower, and that Army air controllers may not employ aircraft as effectively as Air Force air controllers, even if trained to the same standards.<sup>142</sup> The Marine Corps appears to be facing a similar problem: a shortage of air controllers to meet the needs of company-sized, and smaller units. To increase the number of air controllers, the Marine Corps allowed non-aviators to train for this mission.<sup>143</sup>

In October 2004, the Air Force announced the creation of a Joint Air-Ground Operations (JAGO) office that would serve as a focal point for this mission area. While this appears a welcome step, the JAGO's stated goals for both the near and medium time frame were technology improvements, not the more difficult, but potentially equally valuable doctrinal considerations described above.<sup>144</sup> A speedy resolution of how best to increase the number of air controllers, or otherwise encourage the decentralization of air-ground operations may require oversight from senior decision makers.

**Direct action vs. Supporting or Advisory Activities.** The question confronting policy makers is how much emphasis should be placed on involving airpower directly against non-state actors, compared to advising and supporting allied airpower activities, or allocating resources mainly to ground units and security personnel searching for terrorist leaders. Exploring and resolving this question could have profound impact on procurement, training, and O&M budgets.

One challenge for air forces engaged in direct action against non-state actors is that they often operate in politically charged environments, where their presence can exacerbate tensions between governments friendly toward the United States and local populations that may be sympathetic to terrorists. In its field manual on

---

<sup>140</sup> Elizabeth Rees. “Army Official: Air Force ‘Resisting’ Joint Fire Controller Concept.” *Inside the Air Force*. April 23, 2004.

<sup>141</sup> Jaffe. *Op. cit.*

<sup>142</sup> CRS telephone conversation with representatives of Department of the Air Force, Deputy Chief of Staff for Plans and Programs (AF/XP). November 30, 2004.

<sup>143</sup> Thomas Duffy. “Marines Open Up Forward Air Controller Slots to Non-Aviators.” *InsideDefense.com*. May 6, 2003.

<sup>144</sup> Michael Sirak. “US Air Force Eyes Better Integration with Army.” *Jane's Defence Weekly*. November 10, 2004.

counterinsurgency operations (FMI 3-07.22), the Army notes that “A long-term U.S. combat role may undermine the legitimacy of the H.N. (Host Nation) government and risks converting the conflict into a U.S.-only war.... That combat role can also further alienate cultures that are hostile to the U.S.”<sup>145</sup>

Another consideration is that directly engaging non-state actors in many cases requires highly specialized equipment, such as MH-53J *Pave Low* helicopters as just one example. This equipment tends to be expensive and currently of limited quantity. Personnel also tend to be highly trained and in limited quantity. The Marine Corps notes, for example, that due to adverse operational conditions and the need to often act independently, fighting non-state actors “...requires a large percentage of seasoned and highly trained pilots.”<sup>146</sup> These specialized forces are required, in some number, for action against conventional foes. But a growing need to combat non-state actors might stress the current force structure, or demand that it be increased.

The need for indirect involvement of military aviation such as aviation foreign internal defense (A-FID), in conflicts with non-state actors is widely accepted. One observer asserts that “One of the most important roles that U.S. forces can play in the fight against terrorist groups is to train, advise, and assist the forces of other nations in counterinsurgency and counterterrorist operations.”<sup>147</sup> Also, strengthening friendly-nation airpower (e.g. Philippine military air forces engaged in conflicts with Muslim insurgents) could reduce the chances that U.S. forces would have to get directly involved. Further, if U.S. forces do have to get directly involved, good A-FID will likely increase the options available U.S. commanders by providing more competent coalition partners.<sup>148</sup>

Some argue that DOD already over-emphasizes direct action against non-state actors. For example, one observer writes that

The specialization of AFSOF aircraft such as the AC-130, MC-130, MH-53J and now the CV-22 reflects the emphasis on direct-action, making them particularly expensive, complex, and logistically demanding. If it is the tendency for conventional aviators to think in terms of high-tech conventional platforms, then it should come as no surprise that special operations aviators similarly think almost exclusively in terms of their own specialized platforms.<sup>149</sup>

Those that advocate increasing supporting airpower functions, such as advising allies in aviation foreign internal defense, argue that A-FID is consistent with underlying national strategy. For example, when the 6<sup>th</sup> Special Operations Squadron was being established, the goal was to create “a unit capable of supporting then Defense Secretary Dick Cheney’s contention that ‘our role is not to shoulder the burden

---

<sup>145</sup> As reported in Douglas Jehl. “For the First Time Since Vietnam, the Army Prints a Guide to Fighting Insurgents.” *New York Times*. November 13, 2004. p. A12.

<sup>146</sup> *Small Wars Manual*. *Op. cit.*

<sup>147</sup> Ochmanek. *Op. cit.*

<sup>148</sup> Johnson. *Op. cit.*

<sup>149</sup> *Ibid.*

ourselves, but to assist others in defending themselves.’’<sup>150</sup> These sentiments have been echoed by senior Bush Administration officials regarding the ongoing conflict in Iraq. A-FID advocates argue that the need to assist others in defending themselves is even greater today than it was in 1991. For example:

The changes brought about by 9-11 in the international environment and the direction taken by the 2003 National Security Strategy seems to make forces capable of FID operations, not conventional warfare, the most likely *force de jour* for the U.S. armed forces.<sup>151</sup>

Aviation Foreign Internal Defense (A-FID) advocates also say that A-FID allows the United States to influence the shape and capabilities of foreign air forces in ways that can not only combat insurgents, but also promote stability vis-a-vis neighboring countries. By helping the Pakistani Air Force improve its counter guerrilla capabilities, for example, A-FID advisors could also attempt to lead Pakistan away from an air force capable of conducting deep, offensive air strikes that might threaten India. In essence, U.S. A-FID advisors could help Pakistan build a coast guard rather than a navy.<sup>152</sup> Finally, while A-FID advisors could still risk alienating local populations hostile to U.S. activity in a given country, the A-FID “footprint” would likely be much smaller than a direct involvement of U.S. airpower, and could reduce the chances of alienating the population.

The Air Force Special Operations Command (AFSOC) describes A-FID as a complement to direct action. Policy makers wishing to elevate A-FID from a complement, to an activity equal in scope to AFSOC’s direct action, may consider increasing the 6SOS’ resources. The 6SOS’ annual budget of approximately \$5.6 million is a small fraction of the Special Operations Command’s roughly \$2 billion budget for procurement, RDT&E and O&M.<sup>153</sup> Historically, the 6SOS has encountered difficulties acquiring the types of fixed- and rotary-wing aircraft it needs to advise developing-world air forces. Scholars suggest that purchasing these relatively “low tech” aircraft runs counter to Air Force cultural bias toward acquiring technologically advanced aircraft.<sup>154</sup> Further, 6SOS personnel require specialized training that allows them to operate independently in austere and foreign environments. Advocates maintain that augmenting the 6SOS budget would sustain or improve this training, and allow the 6SOS to increase its personnel.

On the other hand, advancing the Air Force’s A-FID activities may require more than increased resources. Several observers have noted that the 6SOS’ unique mission and practices have made it something of a “redheaded stepchild” within the

---

<sup>150</sup> *AFSOC Foreign Internal Defense*. (Hurlburt Field: HQ AFSOC, July 1991) p. 8. As cited in Johnson, “The 6<sup>th</sup> Special Operations Squadron and the Icarus Syndrome.” p. 7.

<sup>151</sup> McCarthy. *Op. cit.* p. 28.

<sup>152</sup> Searle. *Op. cit.*

<sup>153</sup> United States Special Operations Command. *Fiscal Year (FY) 2005 Budget Estimates* RDT&E, Defense-Wide, Procurement, Defense-Wide, and Operations and Maintenance. Does not include supplemental appropriations.

<sup>154</sup> Johnson. *Op. cit.* p. 8.

larger Air Force. Reportedly, the 6SOS has experienced considerable growing pains due to a lack of visibility and influence with Air Force leaders.<sup>155</sup> Some say that finding ways to give the 6SOS more traction within the Air Force bureaucracy may be another way to foster increased A-FID capabilities. They cite requesting annual reports on A-FID, or elevating the rank of the squadron's commander, currently a Lieutenant Colonel, or making this a joint organization as three potential approaches.

In November 2005 it was announced that 2,660 Marines would join the Special Operations Command. In addition to two battalions of "trigger pullers" approximately 800 of the Marines will be specialists in intelligence, logistics and Foreign Internal Defense.<sup>156</sup> Supporters of improving A-FID capabilities could see this as an opportunity. If the Marine Corps is now willing to place its troops under the control of SOCOM, some might argue that the timing is right to augment the 6SOS with a detachment of Marine aviators. Adding Marines to the 6SOS would not just increase the squadron's manpower, but would also likely improve knowledge and processes among all parties, as Marine Corps experience with close air support and FID is introduced to the Air Force. Creating a joint capability in A-FID could also raise the bureaucratic prominence of the 6SOS, some might argue. Others might argue that such joint "marriages" tend to take time to implement, and that the cultural melding of Air Force and Marine Corps aviation assets won't likely happen in the near future.

---

<sup>155</sup> McCarthy. *Op. cit.* p.28.

<sup>156</sup> Bradley Graham. "Elite Marine Unit to Help Fight Terrorism." *Washington Post*. November 2, 2005.